RAILROAD GAZETTE

FRIDAY, SEPTEMBER 3.

American Society of Mechanical Engineers.

The Secretary, Mr. F. R. Hutton, has issued the following circular, dated at his office, No. 280 Broadway, New York:

The Secretary would make the preliminary announcements for the fourteenth convention, which will be the seventh annual meeting. The Council have decided to hold that meeting in the city of New York, and acting under the rules have fixed the date for the week immediately following Thanksgiving week. This latter date has been chosen to give opportunity for the western members who would like to visit New England for that festival to attend the meeting on their way home, and also to avoid interference with the election dates in the different states. The exact date and further details of the sessions and excursions will be the subject of the later circular.

It was acknowledged on all hands that the new rules for presentation and discussion of papers contributed materially to the professional success and interest of the Chicago meeting. A resolution was passed indorsing them and recommending their continued enforcement. Under these rules, all papers of a meeting are to be in type, and a copy of each is to be sent to every one who signifies his intention to attend. Every one is expected thus to familiarize himself in advance with the papers, so that the actual presentation by the author is by abstract only and is limited to five minutes, and by this means the maximum time is left available for well-considered discussion. The distribution of printed papers before the meeting makes a demand for an apparently early delivery of their text to the Secretary, to give time for preparing the cuts, etc; hence, authors are requested to give notice of the titles immediately if they wish to claim presentation at this meeting and to send in their MSS. before Sept. 22.

The society at the Chicago meeting passed a resolution that papers on *shop economics* should be solicited for reading in the general meetings instead of before an economic section of the society only. Members who have facts and methods of value in the matter of systems of shop-orders, methods of accounting, of superintendence, of management, and of economic production will be gladly heard from. It was found also that the topical queries and discussions would have been even more valuable had it been known in advance that certain of them were coming up. An effort will be made this fall to send these topics around in advance, if members will send to the Secretary their queries and points several (at least four) weeks before the date fixed for the meeting.

The copies of Vol. VII. of the *Transactions* will be distributed in the early fall. Members who have in this or previous years notified the Secretary of their wishes as to binding will receive their copy in the form preferred, which will be assumed in the case of old members to be the same as last year's. New members who wish the morocco binding and have not already ordered, will please notify at once. The volume is sent in paper cover where no word is received otherwise.

American Institute of Mining Engineers.

Prof. R. W. Raymond, Secretary of the institute, has issued the following, dated New York, Aug. 28:

1. The 46th meeting of the Institute will be held at St. Louis, Mo., beginning Tuesday evening, Oct. 12, 1886. Prof. W. B. Potter is Chairman of the Local Committee, and the Secretary, to whom all communications concerning arrangements, rooms, etc., should be addressed is Mr. Eliot C. Jewett, P. O. box 576, St. Louis. The office of the Local Committee is at No. 214 Olive street.

Hotel headquarters will be at the Southern Hotel. Hotel rates are as follows: *Southern and Lindell*, $3 per day for inside rooms, $3.50 for outside rooms, $4 to $4.50 with parlor. *Laclede*, $2 to $2.50 per day. *Planters'*, $2.50 regular board, or $1 for room. *Hurst's*, $1 for room.

2. The following programme is provisionally announced:

Sessions on *Tuesday* evening and *Wednesday* morning, afternoon and evening.

Thursday, excursion to St. Joseph & Desloges lead mines and works, Pilot Knob and Iron Mountain.

Friday, visit to the Exposition; drive to Cheltenham Smelting & Refining Works and fire-brick manufactories, and to public parks; subscription dinner in the evening.

Saturday, river excursion to Carondelet and Crystal Plate Glass Works, 35 miles from St. Louis.

In addition to these excursions, arrangements will be made for the accommodation of members desiring to visit other places of interest. Particulars will be given in the programme of the Local Committee.

3. Postal cards are herewith inclosed to members and associates in the United States, to be signed and returned as addressed. Those receiving this circular without the postal cards are requested, if they purpose to attend the meeting, to notify the undersigned. Information concerning railroad facilities will be given hereafter.

4. Members proposing to present papers at this meeting are requested to give notice to the Secretary at this office immediately, and to forward as early as possible either the manuscript of their papers or such full abstracts or descriptions as will indicate the nature, substance and length of the papers, and the number and size of the accompanying drawings.

5. Volume XIV. of the Transactions has been distributed to all members and associates not in arrears. If any such have failed to receive it, they should give immediate notice that the proper inquiries may be made of the post-office authorities.

Whoever has not paid his dues for the current year is requested to remit at once $10 (or $11 if the volume is desired in half-morocco), when Vol. XIV. will be forwarded without delay.

Contributions.

Forgings by the Piece-Work Plan.

FORT WAYNE, Aug. 24, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In reply to Mr. De Sanno's question in your issue of Aug. 13, would say that forgings are made on the piece-work plan, and therefore, not accepted until after an inspection proves that they have been finished correctly. Bolts are no exception to the rule. Our practice is to place upon one man the duty of examining all forgings and laying them off before they are turned over to the machine.

This last, however, is not then relieved of all responsibility, but is also required, before proceeding to finish the work as *laid off*, to carefully examine the forging, and assure himself that it will finish to the drawing or templet, with which he has been furnished. Thus we have a double check upon the smith. Improperly finished forgings are returned to the smith, for any necessary alterations which he is required to make without any further allowance of time. If the forging is spoiled he loses his labor upon it, and is charged with the value of the material less scrap. F. D. CASANAVE.

Culvert Foundations.

CEDAR RAPIDS, Iowa, Aug. 10, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Mr. Lelime asks, in your issue of Aug. 6, if paving should extend beneath walls or be placed between walls in stone box culverts. This company, the Burlington, Cedar Rapids & Northern Railway, is building a number each year, and place paving between walls only, the chief reason being that walls must often be sunk two or three feet or more below general surface of water-way to find firm foundation.

It saves both masonry and labor to follow this plan. Each wall can be placed separately, and water can then be better kept away from the foundation pit.

I would like to learn the opinion of some of your readers in regard to dry masonry for culverts up to double 3×4 ft. spans in the clear; also how they determine amount of water-way for openings. J. M. B.

Foreign Railroad Notes.

The Russian Government has intervened to prevent certain railroads from making rates too low. The statement of the case we find is that some of the greater companies sometimes "slaughtered the rates" in order to compete with shorter routes to the seaboard and divert traffic from them, though this policy has brought them to the border of destruction. Such companies have coolly enjoyed the government guarantee for years, have immense debts, and by their action hitherto have been brought near to bankruptcy and to forfeiture to the state.

The Austrian government has recently published a report on the state of tree culture along the Austrian railroads. On most of them fruit trees are grown more or less on the right of way, the whole number being 254,578. The management of the State Railroads says that this tree growing requires very strict supervision, and pronounces against planting fruit trees or berry bushes on the embankments, and says that grass is better. None of the roads make anything out of the fruit trees except in the Southern Tyrol, where mulberry trees have brought in something. The fruit as well as the grass is usually left to the track watchman. There are 2,608,724 bushes on the Austrian roads, which is 315 per mile of road.

In Russia there are 33 railroad schools intended for the instruction of employés above lower grades, such as enginemen and roadmasters. These were first established in 1869, and until this year they were conducted by the railroad companies under state supervision, but they have become government schools under the direction of the Minister of Transportation. The course lasts three years; beginners must be between the ages of 14 and 17 years, sons of railroad employés preferred. The studies in the course are religion, elementary mathematics, practical accounts, surveying, principles of physics, telegraphy, the theoretical and applied mechanics, the elementary principles of engineering, railroad construction and operation, drawing, writing, practice in the machinists', smiths' and cabinet-making trades, singing and gymnastics. A certificate that the student has finished the course creditably gives the holder the preference for appointment in railroad service and relieves him from some of the obligatory military service. The cost of the schools is paid partly by tuition fees, partly by assessments on railroad companies, and partly by the government.

The Hungarian railroads at the end of 1885 had to work their 5,610 miles of railroad, 1,503 locomotives, 1,264 tenders, 138 snow plows, 2,587 passenger cars, and 31,697 freight cars. Per 1,000 miles of road, the equipment there and in the United States was:

	U. S.	Hungary.
Locomotives	203	268
Passenger cars	135	459
Freight cars	6,358	5,650

The average capacity of the freight cars is perhaps one-half greater here than in that country, and perhaps our passenger cars equally exceed those of the Hungarian roads. This would still give Hungary about 2½ as many car seats per mile of road, while our roads have about 50 per cent. more freight room. But Hungary has a population of no less than 2,803 per mile of railroad; the United States only about 460. There is in Hungary a car seat for about 160 inhabitants, here one for 63 inhabitants. There there is car room for a ton of freight for every 50 people; here for every 5. Hungary produces grain, timber and cattle for export, as we do, but is much less advanced in manufactures than the Western European states or this country. The difference in the freight car capacity provided for a given number of people shows how much more transportation is consumed, as it were, in this country than there—more also than anywhere else in the world, doubtless.

The number of railroad accidents reported in Austria for three years, the miles of road worked, and the train miles run were:

Year.	No. accidents.	Miles.	Train miles.	Persons—Killed.	Persons—Injured.
1882	932	7,195	33 949,000	142	350
1883	1,165	7,645	36.705 600	121	369
1884	1,201	7,852	40.173,000	108	432

The number of miles traveled to each person killed or injured was:

	1882.	1883.	1884.
To 1 killed	69,464,000	90,846,000	107,200,000
To 1 injured	28,181,000	29,789,000	26,800,000

The employés and tresspassers are the great sufferers, a elsewhere, the killed and injured having been:

	1882. Killed.	1882. Injured.	1883. Killed.	1883. Injured.	1884. Killed.	1884. Injured.
Passengers	3	13	3	37	6	45
Employés	58	270	70	265	55	317
Others on trains	..	3	..	8	1	10
Others not on trains	81	64	48	59	46	60
Total	142	350	121	369	108	432

In the three years 183 employés were killed to 12 passengers and 176 other persons; 852 employés were injured to 95 passengers and 183 other persons.

Of the 1,201 accidents in 1884, 178 were derailments, 103 collisions, 337 breakages of rolling stock, 54 running over cattle or vehicles, and 442 were accidents to persons, presumably not caused by train accidents.

More than two-thirds of the derailments occurred at stations, and only one-fourth to passenger trains. Of the whole number of derailments in 1884, 7⅞ per cent. were due to defects in the road, such as rail breakage, etc., and 15¾ to defects in wheels or tires. More than a fourth were due to faults in switching, and 28 per cent. of the collisions to the same cause. No one was killed by a derailment and only six were injured, and only one was killed by a collision, though 55 were injured.

Foreign Technical Notes.

An advertisement of the Wurtemberg State Railroad management announces that the position of Chief Master of Machinery at Stuttgart, with a salary of $900 to $1,200 per year, is to be filled. "The Chief Master of Machinery has supervision of the railroad shops, of the locomotive and steamboat engine service, and also of the maintenance of the rolling stock, and the mechanical arrangements relating to the railroad and steamboats. Aspirants who possess the requisite technical training and can give evidence of the necessary knowledge and experience in shop and train service are invited to give notice," etc.

That the car coupler is a living question in England as well as here is shown by the following paragraph from *Herapath's Railway Journal* of recent date:

"The Midland Railway Co. is about to give trial to a patent wagon coupling, which was tested at the Nine-Elm coupling trials last March. It is the invention of Mr. Fenwick, of Gateshead. It is stated that one or two other railway companies are about to make experiments on one or other of the various appliances tried at Nine-Elms, so that the necessity of the men going between the buffers to couple and uncouple the wagons may be obviated."

The breakages of axles have been reported as follows by railroads of the German Railroad Union, for four years:

	1882.	1883.	1884.	1885.
No. roads reporting	59	43	45	38
Axles broken of—				
Locomotives	26	10	35	20
Tenders	43	35	28	35
Passenger cars	2	3	3	..
Freight cars	110	100	96	88
Total	181	157	162	143

The average time of the axles that broke last year was: Under locomotives, 13 years 5 months; tenders, 17 years 1 month; cars, 18 years 2 months. The average distance run before breaking was:

	Locomotive.	Tender.	Car.
1885	210 050	202,534	244,812
1884	243,388	241,418	218,006

The maximum service was 399,436 miles by a driving-axle of crucible steel belonging to an express locomotive of the Brunswick Railroad, 315,314 miles by a wrought-iron tender axle of the Bohemian Western, and 348,260 miles by a wrought-iron freight car axle of the Bavarian State Railroads.

The average load borne by the axles which broke, and the load which they were intended to bear, were, in pounds:

	Axle. Locomotive.	Tender.	Car.
Load when broken	24,988	14,511	13,754
Standard load	25,111	16,280	15,347

In only four cases were the axles which broke (all car axles loaded beyond their standard load, and in these cases only 2.4 per cent. more. The Union's report gives the number of axles that parted of every manufacturer, and the material. There were 95 of iron, 7 of puddled steel, 13 of Bessemer steel and 28 of cast steel, but the number of axles of different metals in use is not given, so that it is not possible to judge from this which material stood best. Six of the broken axles had been in service 30 years or more; 19, 25 or more; and 35, 20 years or more. There were 63 breakages while running on the open road, 43 while running through yards, 7 in switching, 21 at inspection, 1 by a collision and 2 by derailments.

The causes of fracture are given as follows:

	Steel.	Iron.	Total.
Defective material	17	25	42
Bad workmanship	1	..	1
Old crack that should have been detected	13	16	29
Old crack that could not have been detected	5	33	38
Collision	1	..	1
Hot boxes	..	8	8
Unknown	11	13	24
Total	48	95	143

Besides these breakages, the following cracked axles were detected in the shops or elsewhere, and were removed from service:

Year.	Under. Locomotives.	Tenders.	Cars.	Total
1886	111	102	1,798	2,011
1885	100	69	1,587	1,756

Of these axles that failed, 1,846 were iron, 26 cast steel, 7

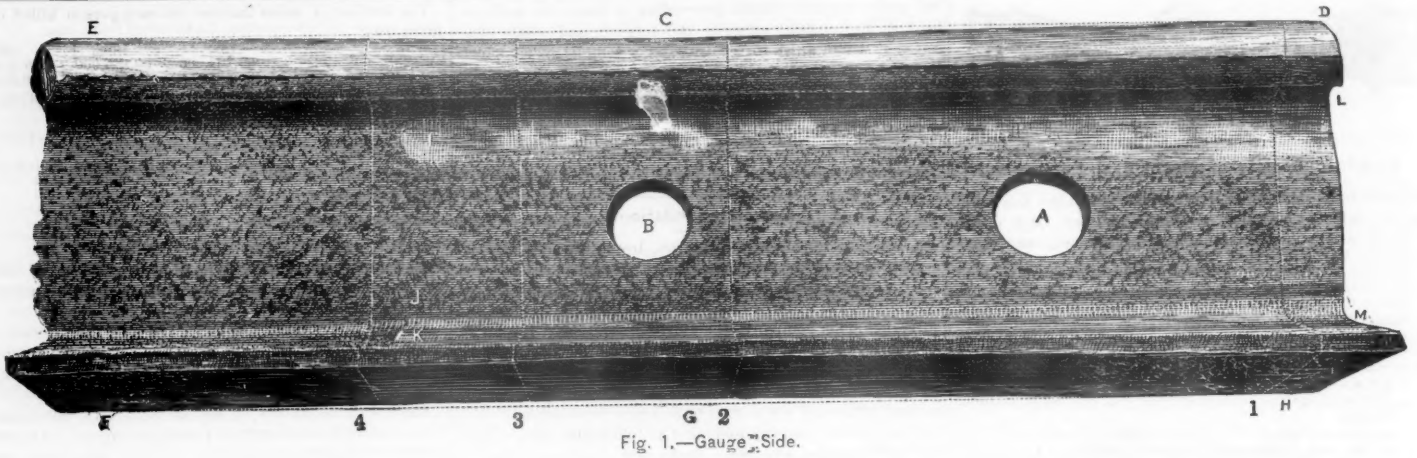


Fig. 1.—Gauge Side.

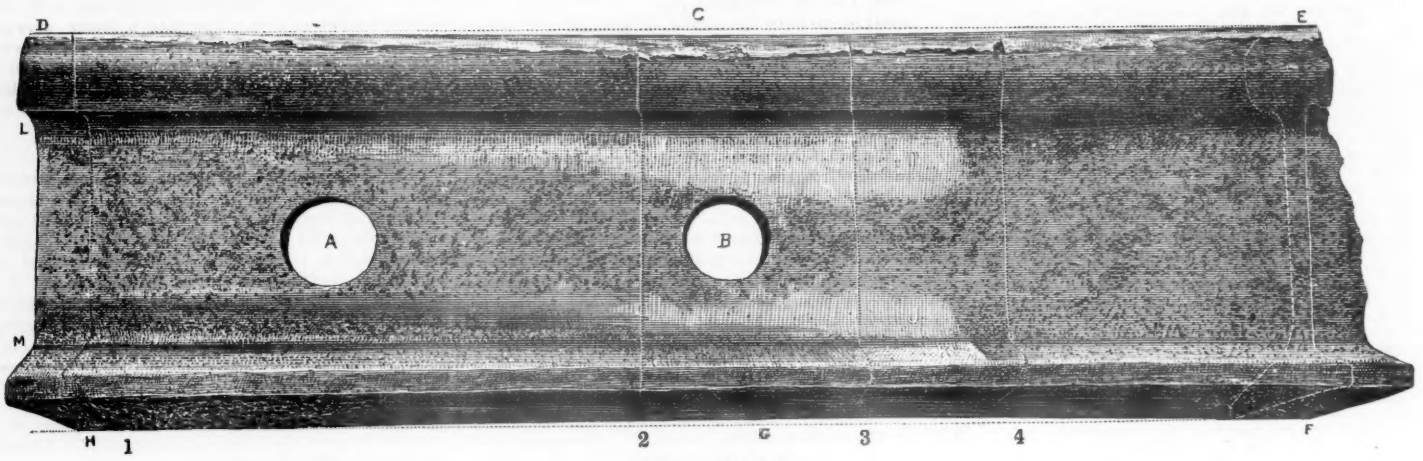


Fig. 2.—Outside.

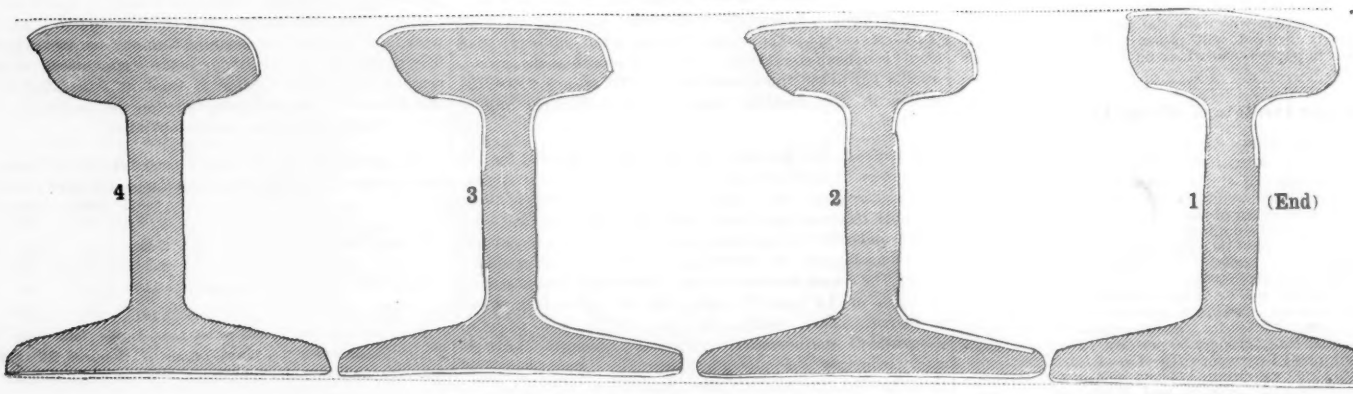


Fig. 4.—Sections at 1, 2, 3 and 4, Figs. 1 and 2.

WORN RAIL END, PENNSYLVANIA RAILROAD.

puddled steel, 129 Bessemer steel, and 3 crucible steel. Of the steel axles 62, and of the iron axles, 1,247 broke in the wheel seat, while 4 of steel and 262 of the iron broke close to the inner side of the wheel, and 16 of the steel and 259 broke in the journal. Only 7 of the steel axles, but no less than 1,869 of the iron axles, had been in use 20 years or more; and but 26 of the steel and

Fig. 3.—View of Rail in Figs. 1 and 2.

147 of the iron were less than 16 years old—that is, 8 per cent. of the whole number renewed for flaws.

The Wear of Joints.

We present herewith some very carefully prepared drawings of a worn rail and a worn fish-plate, made with a view of showing not only the amount, but (what is far more important) the nature of the wear to which joints are subjected in service. The drawings are faithful reproductions from photographs of the original rail and joint. The very difficult task of correctly reproducing the actual appearance of the worn metal, showing where, how and how much it has been worn away in service, has, we think, been very well fulfilled by the engraver.

The views of a worn rail, Figs. 1, 2 and 3, were made from a 66-lb. rail of superior quality, which had been in use something like nine years on the Pennsylvania Railroad. To illustrate the law of wear, rather than its rate, its particular age does not matter. Fig. 1 gives a front or inside view of the rail, and fig. 2 an outside view. The rail was tipped somewhat in each case to give a view of the bottom, which somewhat foreshortens the cut and gives an unusual and unfamiliar appearance, which needs to be borne in mind.

This rail had been sawed in pieces at the points indicated by the dotted lines (and in fact at three other points), in order to enable the sections to be better examined and compared, and fig. 3 attempts to give a separate view of the end piece only, but shows very inadequately how the metal had been battered and worn at the ends.

The separate pieces were carefully "assembled" for taking the larger views, and the more important sections were then placed side by side and photographed to give the outlines for fig. 4. To indicate on these sections where the metal had been worn away, a white space has been left along the sides of the section, for lack of any other convenient way to indicate it. The base of the end section 1 was, however, not polished, and the cut is to that extent in error. The dotted line at top and bottom of the sections corresponds with the similar dotted lines in figs. 1 and 2, and the sections are correctly placed in relation to it.

The angle-bar, shown in figs. 5 to 7, is one of a pair which had been in use for many years on the "Pan-handle" (Pittsburgh, Cincinnati & St. Louis) line: we believe, some seven years. Both the rail and the angle-bars are, it is evident, more worn than would ordinarily be permitted on first-class track, and for this very reason are more suitable for engraving, since they indicate the law of wear on a somewhat larger scale. They were selected somewhat at random and by chance, however, and many more worn examples might doubtless be found by a little search, although the average, as stated, must show considerably less wear.

Fig. 5 shows the section of the angle-bars, which is an old Pennsylvania standard; fig. 6 gives an inside view, and fig. 7 an outside view. The cuts of both rail and angle-bar

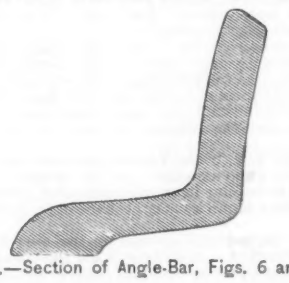


Fig. 5.—Section of Angle-Bar, Figs. 6 and 7.

have been reduced as nearly as might be to one-half scale: the rail a little the most. They were, of course, from double track.

The rail will be seen from the bottom wear at *G* to have been a suspended joint. It is somewhat difficult to explain the very large wear which takes place over the tie, and which in this case amounted to almost as much as the extra top wear beyond the joint, due to the jump of the wheels. At *F* and *H* the rail had its natural surface.

The side wear at *I J K*, where the end of the angle-bar comes, will be seen to be very pronounced. At *K* there is a decided depression on both sides of the rail, which on the outside (fig. 2) is very pronounced indeed, there being a ridge a full $\frac{1}{16}$ in. deep where the end of the angle-bar came. The cause of this is easily seen. When the load comes on th

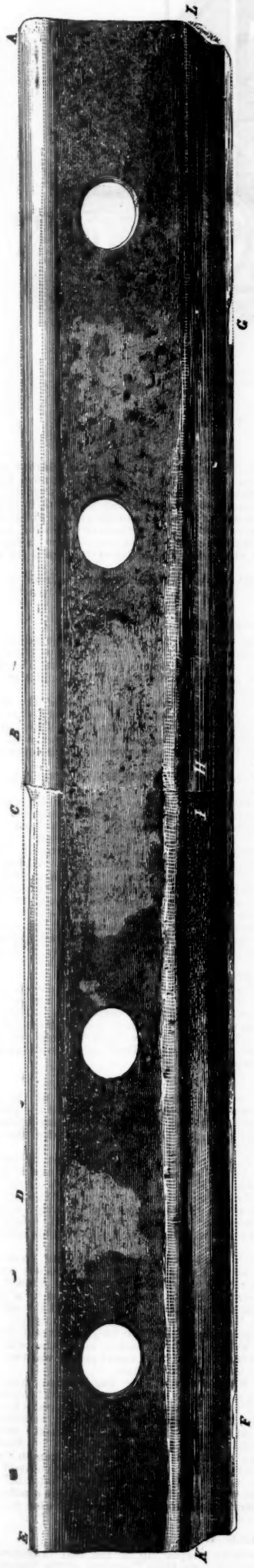


Fig. 6.—Inside View.

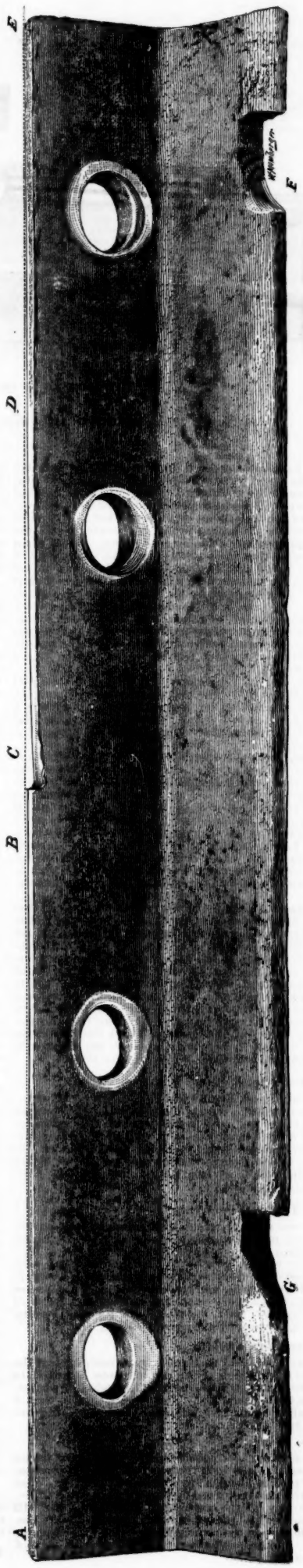


Fig. 7.—Outside View.

WORN ANGLE-BAR, PITTSBURGH, CINCINNATI & ST. LOUIS RAILWAY.

second or receiving rail, as the rail carrying the load deflects (see fig. 9 on the editorial page) the angle-bar tries to resist deflection, or rather to produce what engineers call a "contrary flexure," as in fig. 10 on the editorial page. This necessarily causes, at least it apparently should cause, the greatest wear between the *base* of the rail and the fish-plate to come at the end of the latter. The engravings show curiously well that this is what actually takes place. It is noticeable at *K* and *L*, fig. 6, as well as in the cuts of the rail. The considerable wear at *H*, fig. 6, near the middle of the angle-bar, is due to another cause—the direct impact when the load strikes *C*.

The great wear on the top of the rail at *C*, figs. 1 and 2, indicates that this was the receiving end of the rail, the wear being in accordance with a law which is now generally understood as a fact, although the cause of it is a little more obscure. At *D* the top corner of the end of the rail had been battered over, apparently by the effect of a corresponding lip on the other rail, and the bearing on the fish-plate at *L* had caused a deep cutting and distorsion of metal, visible most clearly in fig. 3.

In the angle-bar, figs. 6 and 7, the cutting at the spike notch caused by creeping, *F* and *G*, fig. 7, is faithfully reproduced, as also the wear at the bolt-holes. The most interesting feature, however, is the wear on top. A straight line has been dotted in to connect the points *A* and *E*, with a parallel dotted line at the base. From the latter it will be seen that the angle-bar appears to have been slightly sprung, although not noticeably.

On the first end of the fish-plate, *A B*, there has a little wear taken place toward the middle quarter, but not much. At *C*, however, there is what can only be described as a gouge, which we find to have been slightly exaggerated by the engraver, in the effort not to lose it, but to amount to very nearly ⅛ in. It decreases rapidly to *D*, and from *D* to *E* amounts to but little. The cause of it is plainly the sudden blow which the wheel gives after the jump over the joint, and its effect is reproduced on the face of the angle-bar at *H*, fig. 6, where it is necessarily on the oppo ite side.

These two depressions, *C* and *H*, represent the effect of the effort which the angle-bar makes to hold the rail-ends together against the natural tendency of the two to separate when one is loaded and the other not. The two points of lesser wear *B* and *I*, represent the same thing, but in the latter case they represent the effect of a load gradually applied, and in the former case the effect of the same load applied with a blow.

We have discussed in another column the moral to be drawn from these examples of wear. Their interest lies, we may repeat, not in there being anything exceptional about them, but in the fact that they are not exceptional, except in the fact that tendencies which exist from the first have been allowed to go further than is consistent with first-class track, and so furnish more pronounced and distinct evidence of laws of wear which may be readily seen in every scrap heap. As respects the difference in the law of wear on single and double track, it is not clear why there should be any difference, except that the wear on double track affords the clearest evidence as to just how and why it takes place, from the fact that the motion which causes the wear is always in one direction instead of alternately in each direction.

Fast Time.

Mr. Ralph Peters, Superintendent of the Little Miami Division of the Pittsburgh, Cincinnati & St. Louis road, sends us the following statement of time made by an extra *Enquirer* train from Cincinnati to Columbus on Wednesday, Aug. 25 last:

STATIONS.	Distance from Cincinnati	Time at Stations	Dist between stations	Time between stations	Rate of speed tween stations	REMARKS.
	miles	A. M.	miles	mins.	Miles per hour.	
Cincinnati....le	....	2.54	....	.....	.....	
Pendleton	3.2	3.00	3.2	6.0	32.0	
Batavia Junct.	8.7	3.04	5.5	4.0	82 5	
Milford.....	14.1	.....	5.4	.....	.....	2 stops for R R. 1 stop & 1 slow for bridge repairing.
Loveland	22.9	3.22	8.8	18.0	47.5	
Fosters.....	27.1	3.26	4 2	4 0	63.0	
So Lebanon...	31 7	3.31	4.6	5.0	55 2	
Morrow.....	36.5	3 35	4.8	4 0	77.0	
Oregonia	45.4	3.46	8.9	11 0	48.5	
Corwin	51.2	3.52	5 8	6 0	58.0	
Spr. Valley....	59.0	....	7 8	....	.....	1 stop for R. R. cros-ing.
Xenia .....{ar.	.....	4.06	....	.....	....	
" ...{le.	65 0	4.09	6.0	14.0	59 4	stop for water.
Cedarville.....	73.1	4.18	8.1	9.0	54.0	
Selma.....	78.9	.....	5.8	.....	.....	1 slow, bridge repairing
So Charleston.	83 8	4 29	4.9	11.0	58.3	1 stop for R. R.
London.....	94.7	4.39	10.9	10.0	65.4	1 slow, bridge repairing.
W. Jefferson...	105.0	4.49	10.3	10.0	61.8	1 stop for R. R. crossing.
Alton.....	110 6	4.55	5.6	6.0	56.0	1 slow for Darby bridge.
Franklinton...	118.9	5.01	8 3	6.0	83.0	
Columbus....ar.	120.3	5.05	1.1	4.0	16.5	2 stops and 1 slow for R. R. crossing.

"Total distance, 120 miles. Total time, 131 minutes. Average speed per hour, 54.9 miles, including 9 stops and reduction of speed for 4 slow orders. Five freight and 1 passenger trains met or passed. Orders all given before leaving Cincinnati, and not a train delayed by the extra. Time, Xenia to Columbus, 56 minutes; distance, 55 miles; 4 stops and 4 slow orders."

The train was drawn by Engine No. 233, which has 16 by 22 in. cylinders and 62 in. drivers; there were two cars. Pat Golden was engineer and Oscar Runyan conductor.

Improved Iron Planer.

The accompanying illustration represents an improved form of iron planer lately introduced by Messrs. Hewes & Phillips, of Newark, N. J.

The driving gear consists of a worm and wheel which drive a large spur wheel which is geared by an intermediate wheel into a gear wheel 28 in. diameter, which in turn gears into a rack on the bottom of the table.

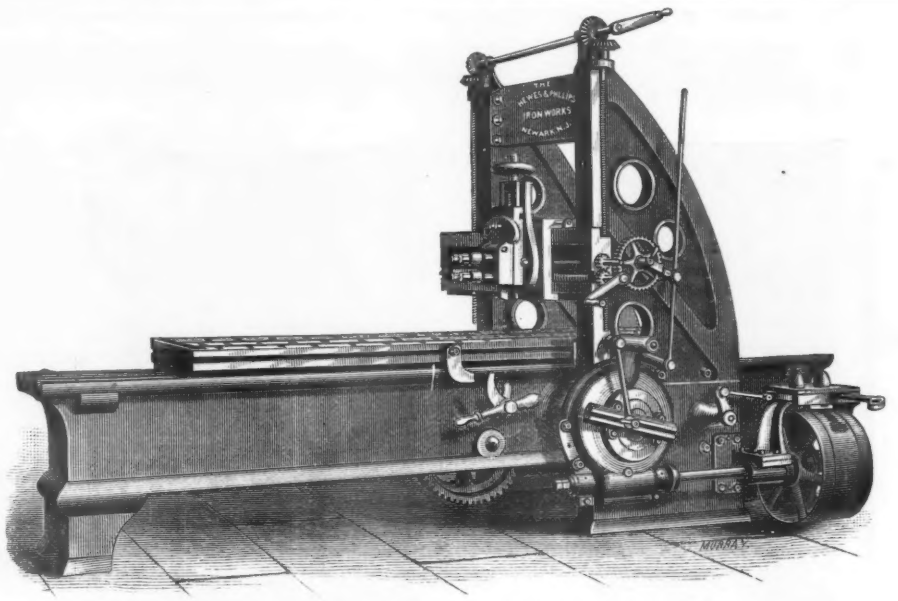
The feed-screw of the heads is fitted with clutches so that the head can be raised or lowered by hand without interfering with the main feed-screw.

The self-acting feed for the side-heads is out of the way and does not interfere with the machinist's access to the work on the machine. The hand-feed only is placed at the front, and is, therefore, easily accessible.

The V-slides of the table are fitted with a novel oiling device, which is found not so liable to gum and clog as those in general use.

When on the cutting stroke, the table travels $\frac{1}{70}$ of the speed of the strap, or, in other words, the power of the strap is multiplied 70 fold.

The feed is self acting in vertical, horizontal, and radial movements, and can be varied at each stroke of the tool.



IMPROVED IRON PLANER.

Made by HEWES & PHILLIPS, *Newark, New Jersey.*

Driver Brake for Consolidation Engines, Chicago, Burlington & Quincy Railroad.

The accompanying engraving represents the form of driver brake rigging lately adopted on the heavy consolidation engines of the Chicago, Burlington & Quincy Railroad.

It will be seen that one brake-shoe is applied to the front side of each wheel, and that the pressure of each brake-shoe is equalized by a triangular equalizer carrying three pins. One pin is attached to the pin-rod from the brake cylinder, another is attached to the lower end of the brake-beam and hanger and the third pin is attached to the pull-rod going forward to the next set of brake-shoes. The distances between the centres of the holes for these pins are so divided that the strain on each brake-shoe is equal.

The details are very carefully worked out, and as they are very clearly shown in our illustration, will doubtless be useful to many of our readers who are thinking of devising or improving similar gear.

The rigging is perhaps open to criticism on one point only The taking-up or adjusting screw on the brake pull-rod being immediately behind the hind driver is not very accessible. The nuts on such pull-rods, even if carefully locked, are very apt to shake loose and need to be placed in a position where the engineer can keep an eye on them, while they should be away from any chance of oil falling on them. Neither of these conditions is fulfilled in position of the adjusting nuts on the rigging under question. Being placed immediately underneath the hind driver box, they are sure to be always well lubricated and therefore liable to slip and impair the efficiency of the brake, and they are, of course, somewhat invisible.

The brake, as shown, is applied to an engine fitted with the Westinghouse pump, etc., but of course the same rigging could be used for a steam brake.

Burlington Tests of Train Resistance—Correction.

We are informed that the Lehigh Valley cars, fitted with the Widdifield & Button brake, had journals $3\frac{1}{2}$ ($3\frac{15}{16}$) × $7\frac{1}{2}$ in., instead of $3\frac{1}{4}$ × 7 in., as we gave them in our issue of Aug. 20 from previous information. The difference is not very material, except that it makes the journals of all the test trains of practically the same diameter.

RAILROAD LAW.

Common Carrier—Responsibility for Delay by Strikes.

Where delay in delivering freight is caused, not by the refusal of the striking employés of a railroad company to return to work, but by the unlawful and violent conduct of the strikers after having abandoned the service of the company, the latter is not liable, according to the decision of the New York Court of Appeals in the case of Geismer vs. Lake Shore & Michigan Southern, reported in the Albany *Law Journal*. The Court said: "It is true that these men (the strikers) have been in the employment of the defendant. But they left and abandoned that employment. They ceased to be in its service or in any sense its agents for whose conduct it was responsible. They not only refused to obey its orders or or to render it any service, but they willfully array themselves in positive hostility against it, and intimidated and defeated the efforts of employés who were willing to serve it. They became a mob of vicious law-breakers, to be dealt with by the government, whose duty it was, by the use of adequate force, to restore order, enforce proper respect for private property and private rights and obedience to law. If they had burned down bridges, torn up tracks, or gone into passenger cars and assaulted passengers, upon what principle could it be held that as to such acts they were the employés of the defendant for whom it was responsible? If they had sued the defendant for wages for the 11 days when they were thus engaged in blocking its business, no one will claim that they could have recovered."

THE SCRAP HEAP.

Holding a Seat.

"Will you be kind enough to watch my seat here and allow no one to get into it while I go into the smoking car and take a smoke?" asked the presumptuous passenger in the opposite seat of me.

What else could I do but answer yes, though I had started out on a pleasure excursion, and this man's condescension quite knocked all the pleasure out of the trip at the beginning, and now that fatal seat lay on my mind like my last year's debts—provided I had some.

At the next station a big man came in, and, spying the only vacant seat, pre-empted it on the spot, and proceeded to make himself comfortable. I sat a long time considering how far my responsibility went, but I saw that I must do something, so I mildly whispered to him that the seat belonged to another, and he scowled and left at the next station, where some ladies got aboard. As a last resort I placed my new hat over in the seat to preserve it—the seat, not the hat—and two of the females sat down on the hat. They did not appear to notice the hat, or probably thought it was the bustle, and began to make themselves at home. I told them as coolly as I could that the seat was occupied. They said of course it was. I remarked that the owner's hat was under them. They obliterated me with a frown and got up; the hat didn't get up. Its get-up was gone. I tried to straighten out the hat and felt sick, so did the hat. I indulged inwardly in some strengthy secular language, and soon a tall, long-haired fellow got aboard, whose pantaloons were poked into his boots to rest, and whose shirt yearned toward a wash-tub, and took the fatal seat without paying any attention to me waving him away.

I had to do it, though I shuddered. I walked to him and gently and politely told him the seat belonged to another man, when, all of a sudden he jumped up as if there was a tack in the seat and gave a regular Comanche howl, as I sat back into my seat, wishing there was a trap door through the floor of the car.

"This seat belongs to another, does it? Where is the duffer? Where are his symptoms? Nothing here. Where are his remains, his silk umbreller, his peanut shells, his tobacker spit, his chewing-gum shoes, his fur-collar overcoat, his thirty-eight caliber valise, and his eye-glass? Show me, if you please, his assets, his liabilities, his heirs, administrators, or assigns! Where is his mortgage, or his lien, or twenty years' lease? I am Cross-eyed Bill from Brazos! (and he parenthicized the name with a couple of long-horn revolvers). Are you the ozone, the canned fruit man who is trying to preserve this seat for the coming man, or the rising generation?"

I begged to prove an alibi, insanity, or anything legal that was necessary or would do any good, and begged him not to mention it, when in came the former occupant and asked the stranger shortly to get out. The stranger got out, and the owner of the seat began to fall all over himself, to explore the ceiling with his feet, to test the floor, to unhandle the neighboring seats, and when the stranger laid him gently down in the aisle and spread him out comfortably to rest, and recuperate, and catch his breath, and get his health back, and try to feel better, and try to be easier, and wait for a doctor, and gather his senses, I had time to think that it was the right way for a man to be served who will ask another to hold his seat during his absence.—*Detroit Free Press.*

Killed while Asleep.

A dispatch from New Brunswick, N. J., Aug. 26, says: "In a collision between a freight train and the drill engine at Deans station, several cars were derailed this morning. William Giles, a brakeman, was sent out to signal an approaching train, but he fell asleep at his post, rolled on the track, and, his lantern being extinguished, was struck by the locomotive of the wrecking train, which first arrived. Giles was almost instantly killed."

Attempt at Train-Wrecking.

An attempt was made to wreck the limited express on the Lake Shore road, near South Bend, Ind., on Thursday night, Aug. 26, by piling a large number of ties on the track near a culvert. They were discovered by a Mr. Steckman, who succeeded in removing the obstruction by the time the train was within 100 yards of it, and thus averted a probable loss of life. The night was very dark, and having no means of signaling the engineer, the train passed on its way, leaving the passengers ignorant of their narrow escape.

All that Was Left of Him.

Upon the arrival of the Pan-Handle train last evening, the inspector found a fragment of a pair of pants attached to one of the brake beams, which fragment included a pocket, in which was a knife and a key. The supposition is that a tramp was stealing a ride and fell under the wheel.—*Indianapolis News, Aug.* 28.

A Big Day's Work.

Yesterday morning locomotive 151, Engineer Charles Logan, left Niagara Falls with the pay car. He ran to Batavia over the "peanut branch" to Syracuse, over the West Shore to Frankfort and returned by the direct road to Buffalo, making stops to pay off the employés. The run covered 515 miles and Logan for his 16 hours' work gets $17.50. The best time made was on the return from Utica to Syracuse, 53 miles in 47 minutes.—*Rochester (N. Y.) Democrat and Chronicle, Aug.* 25.

Attempt at Train Wrecking.

A dispatch from Joliet, Ill., Aug. 26, says: "As an excursion train from Aurora, Ill., was nearing here yesterday with 300 passengers, the engineer noticed an obstruction and stopped just in time to avoid striking it. The obstruction consisted of a pile of timber three feet high. After the train hands had cleared the track, the train started again. It was soon brought to a halt once more, the engineer having discovered another obstruction ahead, which proved to be a fence post that had been firmly planted in an upright position between two ties and protruded from the ground about 18 in. Later on two more posts were encountered sticking up between the ties, and the engine struck one of them before the train could be stopped. This delayed the train for some time.

"The obstructions were all found within a mile of each other. There is no clew to the person who placed them there."

One Monopoly To Be Crushed.

A man of somewhat imposing appearance stepped into one of the general railway offices in Chicago a few days since and inquired for the Passenger and Ticket Agent. The officer was pointed out, and the visitor walked up to him and addressed him thus:

"I am the editor of the puzzle department of the Shawcross *Blizzard*. I have for some time contemplated visiting Niagara Falls, and I have always admired the liberal policy of this road. I would like a pass for myself and wife—Mr. and Mrs. Alonzo W. Ferguson, Shawcross, puzzle department *Blizzard*."

"On what grounds, Mr. Ferguson," said the railway magnate," do you ask for the pass?"

"Why, I am the puzzle editor, as I told you. I get up the column of charades, and enigmas, and word-squares; and my wife has written several articles for the *Blizzard*. Perhaps you have seen them. She signs herself 'Aurora Borealis,' and writes for the temperance department of the paper. I would like the pass good for 90 days. Of course I expect to keep up the charade column right along, and any favors you extend to me will be reciprocated. For instance, I can work up your road into a first-class enigma, or make an acrostic out of your name in the very next——"

"I hardly think, Mr. Ferguson," interposed the General Ticket Agent, "that I can grant you a pass on these grounds."

"And I think, also," said the visitor, severely, "of writing a book——"

"I hope not Mr. Ferguson——"

"In which this grasping monopoly will be shown up to the public in its true light. It is a vampire, sir; a blood-sucker; a soulless and hide-bound corporation. Just you look in the puzzle department of next week's *Blizzard* and you'll find this whole institution worked up into the most crushing acrostic you ever saw! That's all. Good-day sir!"—*Chicago Tribune.*

Pathfinders.

"Please, sir," said the weary tramp, pausing at the door of Sandie McCairnie's railway restaurant, "will you give me something to eat?" And he, in the grim Scottish humor of the paradox, said gruffly, "Gnaw!" and handed the petitioner a soup bone.

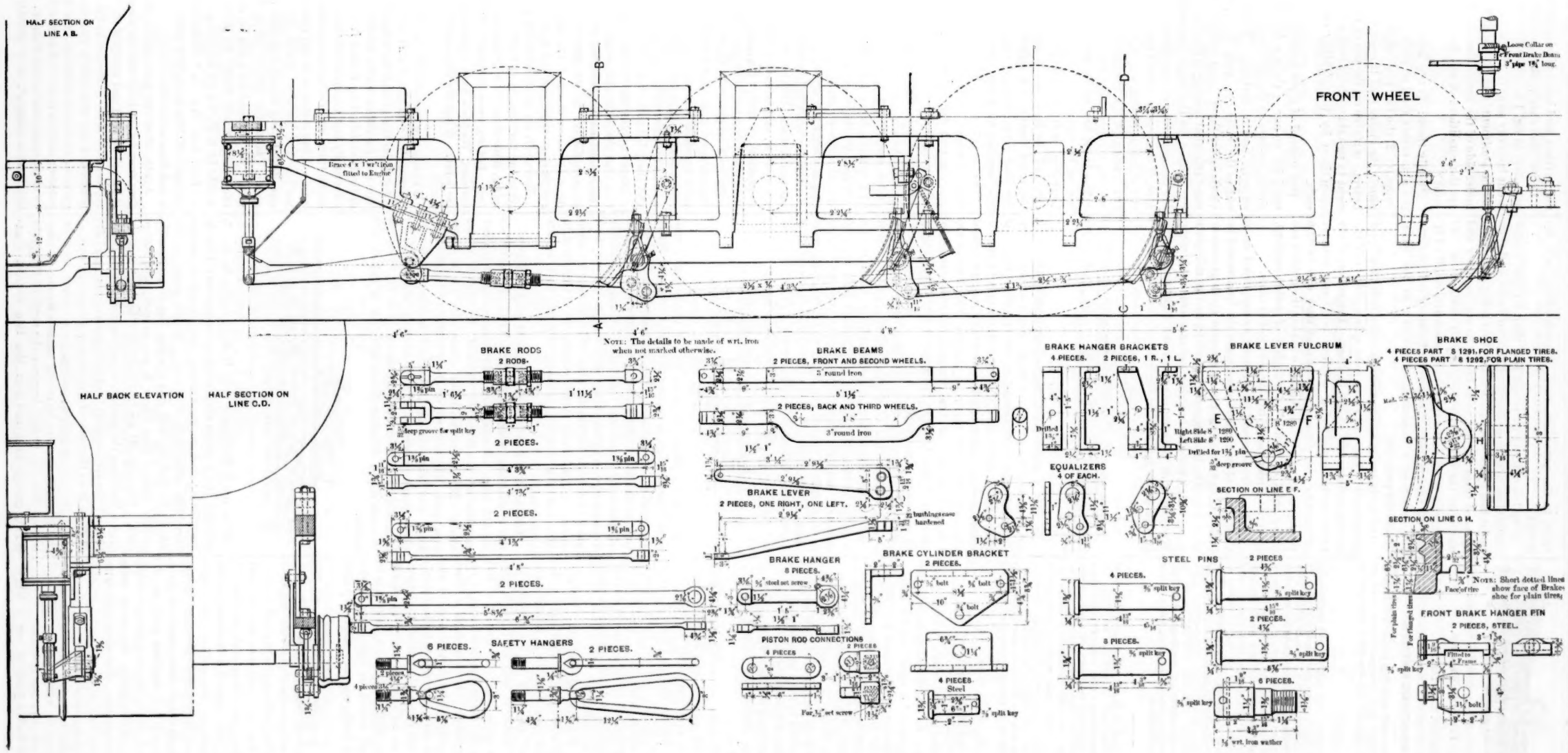
"Well, sir," remarked young Mr. Peanuts as he laid his nobby new hat in the box and put on his blue cap with the gold band, "I was to Fourlegs & Hornblower's circus last night, and there was a bear there so tame it would eat off your hand." But the postal clerk said that was nothing; when he was in the Rockies, in '59, there was a wild, rough, untrained bear came down one night and ate off his pardner's leg.

"Why was the giant Goliah," asked the sad passenger, "like a blind man?" Everybody glanced carelessly toward the fat passenger, who was trying to arrange himself, two valises, shawl-strap, hat box and lunch basket in a single seat, and then they gave it up. "Because," said the sad passenger, wearily, "his size wan't no account to him." And everybody giggled and pretended to be glad, except the fat passenger, who kicked his lunch basket under the seat, and testily observed that the car for smart people was two cars forward. Then everybody did laugh.

"I used to be a sailor myself," the baggageman was saying to the young gentleman on his way to the Naval Academy. "I hadn't been to sea three days before I dropped a line one day and caught a pike more than a foot long, so hard and tough that a cat couldn't scratch it." "Indeed," said the young man, "what kind of a pike was it, sir?" "Marlinspike, young man, marlinspike," said the baggageman kindly, "don't forget the name; you'll likely catch one yourself one of those days, and you'll want to know what it is." So the young man, who was quite intelligent, made a note of it in his little diary.—*Burdette in Pathfinder Guide for September.*

Travelers' Little Ways.

A woman hurriedly stepped up to the rear brakeman on Conductor Benedict's down train Thursday, at the Naugatuck station in Bridgeport, with the remark: "Is this the right train?" "Where to?" said the brakeman, politely. "Where do you suppose?" she answered snappishly, and such travelers are not alone either. Brakemen often have such people to contend with.—*Hartford Times.*



DRIVER BRAKE FOR CONSOLIDATION ENGINES, CHICAGO, BURLINGTON & QUINCY RAILROAD.

RAILROAD GAZETTE

Published Every Friday,

At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete, if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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THE DEFECTS OF THE FISH-PLATE.

Few things are made by mortal hands which have no defects. Therefore, in starting out to consider "the defects of the fish-plate," it must not be understood that we intend thereby to condemn it. Before this can be properly done, it must be shown, first, that the defects are not curable by some simple modification, without radical change, and secondly, that even a radical change for the better is possible. But it is in all cases profitable to look facts in the face as they exist and to consider defects as they are detected, even in the case of devices which are generally felt to be, in their substance, about as good of their kind as can be hoped for, like the locomotive or the truss bridge, or even passenger and freight cars.

In the case of the fish-plate—by which general title we include angle fish-bars as well, and indeed chiefly refer to the latter—it is very generally felt and admitted that it has very serious defects; that it comes very far short indeed of giving a perfect joint; that it breaks easily; that it wears unequally, and that it causes very objectionable local wear of the rail at the joint. The only difference of opinion is whether these defects are practically remediable.

There are, moreover, defects and defects. Everything which wears or gives out is to that extent defective; but the question then arises as to whether the defects which appear are due only to the natural, inherent weakness of all material, and so curable only in degree, if at all, or whether they are due to a bad and unmechanical way of using material, and so requring more radical measures. If an axle or a brass wears out in service, we recognize that as one of the inevitable things, which may be reduced by using better metal or better oil, but cannot be cured altogether. If, however, the brass or axle wear out very much quicker on one side than on the other, we ascribe it to some curable mechanical defect in the form of the axle or journal-box, or both, and can generally find and correct them.

The question then is: Do the defects of the fish-plate belong to the first class or the last? Do they result, in spite of what is on the whole the best possible way of connecting rails together, and so are an evil which must be borne; or are they due in part or whole to defects *of type*, and so indicate the need of some change of type? It is often of assistance, in attacking doubtful questions of this nature, to escape from the entangling and beclouding effects of habit, which may make a certain detail seem good, or good enough, merely because we are familiar with it, by drawing a parallel which shall give on a larger scale and in a different way substantially the same conditions as those we desire to test. It is almost as true in mechanics as in morals that—

> "Vice is a monster of so frightful mien,
> As, to be hated, needs but to be seen;
> Yet seen too oft, familiar with her face,
> We first endure, then pity, then embrace."

Let us endeavor to get such a parallel, on a larger scale, to the prevalent way of connecting rails together.

A rail is nothing more nor less than a rolled girder continuous over some dozen or sixteen spans, and then succeeded by another girder, the two being connected by some form of joint so as better to act together and minimize the evil of not being strictly continuous. As the girder is light, the spans are necessarily small; 3 ft. as a maximum, with the heavier forms of rail girders; 2 ft. or less as a minimum, according to the usual American practice.

Let us in imagination enlarge and strengthen these girders until they will carry over spans of 15 or 20 ft., and be perhaps 150 to 200 ft. long. The action of the forces we are considering will not be in any manner affected by this change, except that they will be on a larger scale, nor will it matter whether the girders are rolled solid or "built" of a variety of rolled sections, from the girder being too large to roll at once.

Such a girder would of necessity be supported upon some form of masonry piers, since the load would be far too great for ties. Let us connect these girders at their joints by the nearest equivalent to the fish-plate joint which we can imagine on this enlarged scale. We then have (with some exceptions to be noted), the conditions represented in fig. 1:

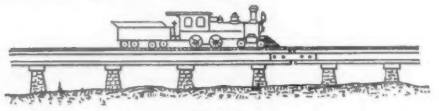


Fig. 1.

Is that a mechanical way of connecting two such continuous girders? Every bridge engineer and every practical man will recognize immediately that it is not; that it would be difficult to take a surer plan for insuring that the two girders and the fish-plate would mutually tear each other to pieces. The defects are not in the details of the connection, and curable by changes of detail, but in the method, and curable only by a change of method.

It may be objected, however, that this only represents the suspended joint type, which is passing out of credit in the United States, although for some reason it seems to be still preferred in Europe, and that to represent properly the supported joint type we should have to make a sketch like fig. 2, which bears enlargement well enough and represents about the best that can be done, whether the girders are continuous over several spans or independent over each span:

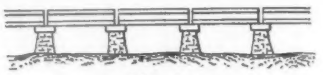


Fig. 2.

This has a plausible look, but it needs but a moment's consideration to see that fig. 2 does not fairly represent the conditions. The abutments under a rail are not unyielding, like masonry structures. They are of necessity anything but solid, settling habitually from an eighth to a quarter of an inch in the very best track under the enormous load which is thrown upon them. Considerable elastic settlement of this kind, in fact, has been found a necessity for the best results with track.

To represent fairly on an enlarged scale, therefore, the conditions which actually obtain in track, we should have to represent our abutments as readily capable of considerable vertical depression under loads. If we conceive the abutments to be large pontoons, floating two or three inches above the bottom, and capable of that much settlement before they finally come to a solid bearing, we shall more accurately represent the conditions, as in fig. 3 (except that the depth of water shown in fig. 3 is rather too great).

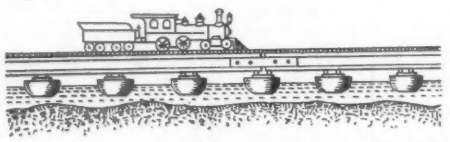


Fig. 3.

How much difference does it now make, in fig. 3, whether the joint be suspended or supported? Plainly very little; and so, experience has shown, it makes very little difference in track. Which plan, on the whole, is best we will not discuss, but no reasonable person claims that there is any very decided difference. The support against deflection in fig. 3 is more direct, but then the projection of the continuous beam beyond the last support back is twice as great, and deflection is as the *cube* of the span or projecting part.

We are now in better position to consider another objection which may be raised against fig. 1. It may be said that it is unfair, because the modern fish-plate is long enough to extend over the two nearest abutments (ties), and has an independent bearing on them.

Let us then extend the parallel: Lengthen out the fish-plate in fig. 1 to cover the two abutments; extend it out laterally so as to give it an independent bearing on the abutment, and give it a direct bearing on the under side of the upper flange of the girder. What are the conditions of satisfactory service from such a joint?

Plainly these: (1) the bearings of the fish-plate on the abutments shall be such as to give it an effective support; (2) the fish-plate shall be stiff enough to carry *nearly* the entire load thrown on the joint, and (3) the bearing surfaces on the top of the joint shall be sufficient to sustain without undue wear the load thrown upon them by the yielding of the projecting beam ends.

But instead of these conditions being fulfilled in a rail-joint no one of them is fulfilled. The bearing of the angle-bars on the tie is well known not to give very effective bearing surface. They spring a little, and unless the bolts are very tight, a good deal; the tie yields under them more readily, and practically the chief effectual bearing is the base of the rail; the leading motive for the angle-bar projection being to stiffen the angle-bar and avoid notching the rail. Therefore, if we simply extend the fish-plate in fig. 1 over the adjacent abutments without adding an independent bearing on the abutment we are nearer to representing actual conditions.

The angle-bar, under these conditions, is well known not to be equal to carrying the entire superincumbent load without permanent set. The stiffness of the rail itself—after it has settled far enough—is the main factor; but, admitting that it can transmit the load properly after receiving it, let us consider the bearings by which the load is received.

The maximum load on an ordinary joint is one driving-wheel. The maximum load on the joint in fig. 1 is two driving-wheels. Therefore, to make a fair parallel, the bearing surfaces should be twice as large, and only that; which means that we should attempt to support against deflection the projecting girder ends in fig. 1, under all the conditions pictured, by a bearing about *one inch* wide on each side.

What would be thought of a bridge engineer who should seriously make such a proposal? It is not putting it a whit too strongly to say that he would be written down an ass forthwith, and laughed out of the profession. Deterioration of surfaces would begin at once, and be sure to continue. The only remedy to prevent, or rather postpone this would be to stiffen the girder, lighten the load carried, and decrease the joint span relatively to those on each side. This is the remedy used in England, and that is the reason the joint question is a less vital one there than here. The rail is heavier in order to use ties three feet apart as well as for more solid construction, the engines lighter, and the joint ties about as close together as ours.

These conclusions we have reached on the assumption that the solid abutments of fig. 1 fairly represent the conditions, whereas we have seen that fig. 3 does so more fairly. If we substitute the foundations of fig. 3 for those of fig. 1, the arguments by which the conclusions were reached apply still more strongly.

Moreover, let us exhaust the possibilities, and complete the parallel, by extending the joint-plate shown in fig. 3 to cover three pontoons or any greater number. Let us even suppose the fish-plate to be continuous. We then have a parallel to the modern three-tie joint. What are the conditions of stability in this case?

Plainly the undulatory strains to which the girder is subjected will throw still severer strains upon the joint from the greater leverage which it has upon it. The sole condition under which such a joint can be entirely satisfactory is that it shall be so strong as to effectually and permanently splice the girders so as to make them equivalent to a continuous girder. Otherwise—if the metal be at any point overstrained or overloaded—the greater length of the joint is in effect only furnishing it leverage for its own destruction, as Mr. Trautwine put it; or, as it has been elsewhere put, "we are sending a boy to do a man's work. If the man's work could be done, and well done, it would be well, but by throwing it on the shoulders of a boy, the boy is 'overstrained' and the bark chipped off him in sundry places, and the man's work is not done after all."

Again, after our pontoons in fig. 3 have settled to a firm foundation they rest on an unequal foundation. It would be well and fairer if the foundation had been represented more irregular in fig. 3. If, with a three-pontoon joint, the middle one reaches a firm support soonest, as in the picture, how great a tendency to rocking motion is created as the load passes over. If, as must more commonly happen, the middle one has the lowest support, how greatly increased are the

chances that the joint will be given a permanent kink. The only insurance against it would appear to be that the joint should be strong enough to carry over a double span with little or no support in the centres. We know of no joint in use which is nearly strong enough to do this.

That these difficulties which we seem to detect are not imaginary is shown not only by the engravings in another column, but by the history of the fish-plate. In the thirty odd years of its history there has been one perpetual tinkering at its form. It was hailed, when first introduced, as a final solution. Then it was begun to change its form, and its bearings, and its material, and its fastenings, and still it did not quite "fill the bill." Then the angle-bar was introduced; first on one side of the rail, then on both sides, and welcomed with effusion. Soon it, too, began to be tinkered. Almost every conceivable kind of section of both rail and joint has been devised to give it a better chance. Still there was seen to be urgent need of a better joint. Finally the three-tie joint was introduced, for the especial purpose of giving the West Shore road the best track in the world, and is now running its course on perhaps a dozen roads as the latest and most hopeful thing. Possibly these hopes may prove to be justified. It is dangerous to make predictions; but we must confess that we are unable to detect in it the conditions of permanent success, and if we were to make a prediction, it would be that the wear at *C*, figs. 6 and 7 of the engravings in another column, will take place much the same, however long the joint, and that the additional cost and weight will not be found to give much added value.

The subject is a large one, and we cannot now follow it in more detail, but we may briefly rehearse in a more precise pictorial way the nature of the difficulty.

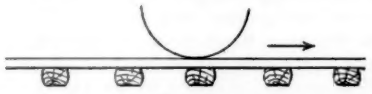


Fig. 4.

When a wheel is rolling along the middle of a rail, as in fig. 4, the rail is in effect stiffened as in fig. 5, and the possible deflection is small. When, on the other

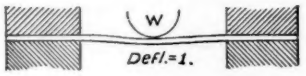


Fig. 5.

hand, it is approaching a joint, as in fig. 6, the conditions are at the very best those of fig. 7, in which the

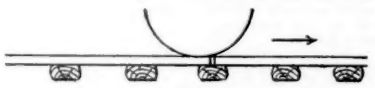


Fig. 6.

natural deflection from the same load is about five times greater than in fig. 5, and this is possible only (except at the very instant when the wheel is over the joint), by having a joint so strong that it can transmit

Fig. 7.

half the weight of the wheel to the next rail before the wheel actually reaches the latter. The natural condition of things, when one rail is loaded and the other not, is that shown either by the solid lines or the

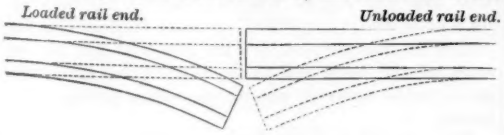


Fig. 8.

dotted lines of fig. 8. It is the rapid alternation of these shearing strains which, it was suggested in our discussion of "Why Rail Joints Break" (Nov. 6, 1885), produces the deterioration of the most strained fibres, which starts a crack and so breaks the joint in detail.

However that may be, what the fish-plate by its form attempts to do, and what is the chief apparent advantage of its actual form over the simple one shown in fig. 10, is to compel the rail-ends to take a curve of contrary flexure, as in fig. 9. It needs no argument to show that it is ridiculously beyond the power of the fish-plate actually to accomplish this, and what is the kind of wear which should naturally result from the attempt? Plainly, a wear greatest at the middle, and tapering off to next to nothing at the "quarter-points" of the top edge.

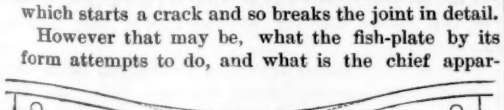


Fig. 9.

Comparing this conclusion with the wear *C D* actually recorded in figs. 6 and 7 of another column, it will be seen that the coincidence of theory with facts could not well be closer. The query then arises: Does the fish-plate in any of its forms in fact accomplish more by its bearings under the rail head

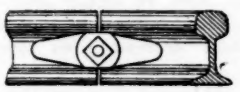


Fig. 10.

than would be accomplished by the simpler form, fig. 10, and is not an attempt to make it do more than this, by using any form like fig. 9, a distinct blow at its life and usefulness, in that the fish-plate then attempts to do more than it is able, and gets battered thereby? With this query—which it must be understood is a query, and not a positive assertion—we for the present leave the subject. The question of how to resist the greater tendency to deflection at the joints is really a distinct issue. We have considered now only the fishing feature, which purports to make the rail a continuous beam.

BRITISH RAILROADS IN 1885.

The Board of Trade report, containing returns of the railroads of Great Britain for the year 1885, has recently been published. The chief facts shown for two years are:

Miles open:	1886.	1885.	Increase.	P. c.
Double track, or more	10,446	10,239	207	2.0
Single track	8,723	8,625	98	1.1
Total	19,169	18,864	305	1.6

The increase in railroad mileage may appear small to us, but is the largest there has been in Great Britain in a single year since 1879, and the only years since 1870 when so much as 305 miles was opened are 1872 (438 miles), 1874 (367 miles), 1879 (373 miles), and 1885 (305 miles). The growth of the railroad system has indeed been very moderate in Great Britain for more than 30 years, yet it has increased from 8,053 to 19,169 miles since 1854, which is 138 per cent., the growth having been twice as great in the first half as in the last half of this period. Thus the number of miles added in each five-year period has been:

	1855-60.	1860-65.	1865-70.	1870-75.	1875-80.	1880-85.
Miles	2,098	2,856	2,087	1,282	1,275	1,286

The period of our war was that of the largest additions to the British system; outside of these five years there were but two when as much as 500 miles was opened; but the greatest length opened in a single year (in 1863) was but 771 miles; the smallest, 163 miles (in 1884.) In the first half of the last 30 years 7,041 miles were opened, an addition of 84 per cent.; in the last 15 years 3,793 miles have been opened, an addition of less than 25 per cent. It is noticeable that the growth fell off all at once after 1870 to about one-half the former rate, and has been remarkable even since, counting by 5-year periods. Evidently the construction of new railroads has long since ceased to play an important part in the industries and national economy of Great Britain, though it has by no means ceased, but goes on at a rate which in the course of another 30 years would add nearly 40 per cent to the mileage.

The proportion of double track is not so great as most people think, being, at the close of 1885, 54¼ per cent. of the whole. Nor does the double-track increase any faster than the single-track road. In 1871, 54¼ per cent. of the road was double track. But before 1871 the proportion of double track decreased steadily for a long time, it having been 74¾ per cent. as long ago as 1854. The impression here that substantially all British railroads are double-track lines is probably transmitted from those early days.

It might seem that in so populous a country the proportion of double track would increase rapidly, unless traffic were stationary; but we must remember that the principal lines were built long ago, and were double track from the beginning; that the lines built for many years past have been chiefly in the less promising situations where not only is the traffic light, but it grows slower than on the other roads; and the pressure of the traffic on the older roads, which already had double tracks, is provided for by additional sidings, and third and fourth tracks, which the Board of Trade does not require to be reported. A considerable number of companies, however, have volunteered to report their third and fourth track, and altogether they report 115 miles of three-track and 330 miles of four-track railroad.

The English railroad mileage may seem insignificant to the American, who has to deal with a system measuring 128,967 miles, against the 19,169 in Great Britain, but the account of its rolling stock shows that its importance is not to be measured by its mileage. We compare it with the equipment of the 127,729 miles of road reporting equipment in the last Poor's Manual:

	Total		Per 100 m. road.	
	Great Britain.	United States.	Great Britain.	United States.
Miles road	19,169	127,729	.....	.....
Locomotives	15,196	25,937	79.3	20.3
Passenger cars	33,656	17,240	176.0	13.5
Other pass. train cars	12,561	6,544	65.5	5.1
Freight cars	464,139	805,519	2,421	630.6

It is probable that our passenger cars have seats on the average for about one-half more than the British passenger cars, and the average capacity of our freight cars is probably nearly twice as great as that of the British "goods wagons." But making all possible allowances, we see that the British roads have an enormously heavier equipment per mile of road, nearly four times as many locomotives, thirteen times as many passenger cars (and probably nearly nine times as many seats for passengers), nearly four times as many freight cars, and probably rather more than twice as much freight car capacity, the difference being least in this last particular. Evidently the British roads provide for a much heavier traffic, and especially an enormously heavier passenger traffic, than the American roads. There are actually more seats for passengers on the 19,169 miles of British railroads than on the 127,729 miles of American lines.

The principal reason for this is that the population per mile of railroad is 460 in the United States and 1,930 in Great Britain, so that the British mile does the work for more than four times as many as the American mile. The number of inhabitants to each piece of rolling stock is:

	Locos.	Pass.	Other pass. train.	Freight.
United States	2,290	3,436	8,180	74
Great Britain	4,107	1,101	2,905	80

Per inhabitant we require many more locomotives and a little larger number of freight cars—probably nearly twice as much freight car room as the British; but they require three times as many passenges cars, and probably about twice as many car seats, indicating much more traveling per inhabitant there than here, or else a much less complete utilization of their passenger cars, which latter is likely to be true, as the existence of three classes of cars tends in this direction, and still more the very large number of short runs, which make it necessary for the cars to lie still a great part of the time.

As to the work actually done by the British railroads, we are left very much in the dark, the numbers of passengers and tons being no criterion in the absence of any knowledge of the average length of journey, and the only thing which can be compared with profit with the work done in other countries is the number of train-miles, which for some purposes is better worth a comparison than anything else, though, of course, the train-loads carried may be very different in different countries.

The train mileage in Great Britain and this country last year was:

	Total.		Per m. rd.	
	Passenger.	Freight.	Pass.	Fr't.
Great Britain	146,458,206	125,929,338	7,640	6,569
United States	214,736,407	354,575,875	1,612	2,758

Which is equal to a movement each way daily over the entire mileage of:

	Pass. trains.	Freight trains.	Total.
Great Britain	10.47	9.00	19.47
United States	2.21	3.78	5.99

So that on the average passenger trains are nearly five times as frequent and freight trains 2½ times as frequent in Great Britain as in this country. For every inhabitant a passenger train was run 3.96 miles in Great Britain and 3.28 miles in this country, and a freight train 3.40 miles in Great Britain and 5.97 miles in this country. Thus if the train loads were the same in both countries, the amount of passenger transportation per inhabitant would be 14 per cent. less here than there, and the amount of freight transportation 80 per cent. greater. The indications are, however, that the average freight-train load is much the larger in this country; as to the passenger-train load, there is very little evidence.

These figures indicate one of two things, however; either the average number of cars per train is much smaller in Great Britain than this country, or they lie idle a much greater part of the time, for the *train mileage per car* was:

Train miles:	Great Britain.	United States.
Per passenger car	4,322	12,420
Per freight car	271	440
Per locomotive	17,925	21,950

If there were an equal number of cars per train, this would mean that a passenger car ran nearly three

times as far in the year here as in Great Britain and a freight car about five-eighths farther. Actually, there is reason to believe that there are more cars in an average British passenger train than in one of ours, but in spite of the smaller freight cars there may not be any more of them per average train there than here, and very likely less. It is quite certain, therefore, that the average distance run per car, whether passenger or freight, is much greater here than there, which the length of the average haul here greatly favors. Even locomotives, which can be utilized much more continuously than cars, run 4,025 miles (21½ per cent.) more each here than in Great Britain. Thus the rolling stock is kept moving much more here than there.

The capital invested in British railroads has increased much more rapidly than the mileage. Since 1854 the mileage has increased 138 per cent. and the capital 185 per cent.; the cost per mile increasing from $172,879 to $207,130. It was not until after 1872, however, that the cost per mile began to increase. At the close of that year it was $175,121, so that an increase of $32,009 (18 per cent.) has accrued within the last 13 years. In that time the capital expended on railroads has increased no less than $1,201,145,450, while but 3,345 miles have been added to the railroad systems. This capital would cover nearly 20,000 miles of our railroads, as their capital stands charged. A great deal of this additional capital of British railroads has been required for necessary improvements and additions to rolling stock; but some of the most trustworthy students of the subject on the ground think that it has not nearly all gone that way, and that many renewals have been provided out of capital which ought properly to have been charged to working expenses. Our railroads certainly will require large expenditures hereafter for construction, as the older ones have heretofore, a large part of which will be seen in additions to second tracks, sidings and equipment; but another large part, expended for safety appliances, improved structures, and for getting above and below street crossings, especially in cities, will not be traced so easily, and, worse than that, may not even increase earnings, but will have to be made nevertheless. That so large an addition to capital cost as $32,000 per mile in 13 years, or $2,460 per year, will be required, is not to be expected--nothing like it. Heretofore the cost per mile has been kept down by the constant addition of new railroads, mostly very cheap.

Of the British railroad capital, very nearly 75 per cent. is in shares; but 16 per cent. is in guaranteed shares, so that the fixed charges are increased by it. Only 1¼ per cent. of the capital is in what are called "loans," but the "debenture stock," of which the other 23¼ per cent. of the capital consists, is a debt the principal of which, for the most part, is never due, and takes the place of our railroad bonds. The entire capital of the British companies amounts to $3,970,509,200, against $8,073,573,394 in this country, with 6⅔ as many miles of road. In this country, too, a very large amount of capital is duplicated in the total by issues of bonds or shares to pay for securities of other companies held in the treasury, which is not so much the case in Great Britain.

While the capital per mile of British railroads has increased so largely of late years, the earnings have not. With a capital of $175,750 per mile in 1873 the earnings were $16,848 per mile; the capital had increased to $207,130 in 1885; the earnings only to $16,921. But if the earnings per mile have not increased, neither have they decreased. They have in fact been wonderfully even for the last 13 years, the largest, $17,768, being in 1883, and the smallest, $16,332, in 1879. There has been since 1883 a decrease of $7,616,000 (2.3 per cent.) in total earnings, which is unusual in Great Britain, and regarded as a somewhat serious matter; but this occurs with an increase of but 2.6 per cent. in mileage, while, in this country, in spite of an increase of 15⅔ per cent. in mileage, there was a decrease of $41,802,000 (5.2 per cent.) in earnings. Fluctuations such as are common here are unknown there.

The earnings per mile in the two countries for four years have been:

	1882.	1883.	1884.	1885
Great Britain	$17.244	$17.768	$17.166	$16,921
United States	7,603	7,548	6,745	6,217

Last year the British railroads earned 2⅔ times as much per mile as the American, and the excess of the British roads has varied from $9,841 to $10,704.

The proportion of the earnings required for working expenses is much greater here than there, but not so much greater as it formerly was. For this proportion was below 50 per cent. in Great Britain until after 1872, and has been from 51 to 55 per cent. since. Here it has been 63.6, 63.9, 65.0 and 65.2 per cent. successively in each of the last four years, and the net earnings per mile and the percentage which they make on the capital have been in the two countries:

Net, per mile:	1882.	1883.	1884.	1885.
Great Britain	$8,277	$8,351	$8,068	$7,953
United States	2,766	2,726	2,355	2,166
Per cent. on capital:				
Great Britain	4.32	4.29	4 16	4 02
United States	4.21	4.15	3.56	3.47

The net earnings per mile were three times as great in Great Britain as here in 1882 and 1883, 3½ times as great in 1884, and 3¾ times last year. For the first two years the percentage of income on the capital was nearly the same here as there, but in the last two years it has been an eighth less here. In both countries it has decreased in each of these years, but the whole decrease from 1882 to 1885 was 7 per cent. in Great Britain and 17½ per cent. here. It should be said, however, that the returns for this country do not make it possible to ascertain this exactly, the capital covering not only the cost of the roads, but hundreds of millions of railroad securities besides, so that the net earnings which go to pay interest on these securities and into the treasuries of the companies owning them afterwards goes to pay interest on the capital of the last-named companies.

Of the total earnings 53.1 per cent. in Great Britain and 68 per cent. here were from freight. The proportion from passengers is increasing here, having been less than 25 per cent. in 1880 and 27 per cent. in 1884. It has varied little in Great Britain from the proportion shown last year since 1869, the largest 42.82 in 1870 and the smallest 41.26 in 1881.

Per train mile the earnings and expenses have been:

	1882.	1883.	1884.	1885.
Earnings:				
Great Britain	$1.26	$1.24	$1.22	$1.18
United States	1.54½	1.49½	1.41	1.36½
Expenses:				
Great Britain	0.66	0.66	0.65	0.62
United States	0.98½	0.89½	0.92	0.89
Net earnings:				
Great Britain	0.60	0.58	0.57	0.56
United States	0.56	0 54	0.49	0.47½

Both earnings and expenses per mile are much greater here than in Great Britain, but the net earnings are not very different—7 per cent. less here in 1882 and 15 per cent. less last year. Earnings, expenses and profits have all fallen off in both countries but most here. If our expenses per train-mile had been as small as the British last year, it would have made a difference of no less than $149,500,000 in the net earnings—an addition of 56 per cent.

The receipt per passenger and per freight-train mile last year was:

	Great Britain.	United States.
Per passenger train-mile	$0.99	$0.93½
Per freight train-mile	1.43	1.50

Thus the receipts per mile for each kind of train are not very different in the two countries—5½ cents less for passenger trains and 7 cents more for freight trains here than there, and the much larger average receipts here per train-mile of all kinds is due chiefly to our much larger proportion of freight trains; they are 62½ per cent. of the whole here, but only 46½ there.

There are but six companies working as many as a thousand miles of railroad in Great Britain, as follows:

Great Western.	London & N. W.	Great Eastern.	Midland.	Great Northern.	North British.
2,346	1,828	1,558	1,339	1,045	1,015

These six together have nearly 48 per cent. of the mileage of the United Kingdom. The capital and earnings per mile of some of the English companies reaches figures which can hardly be matched here, as follows:

	Per mile. Capital.	Earnings
Lancashire & Yorkshire	$401,899	$16,104
London & Northwestern	260,714	26,864
London, Brighton & South Coast	271,828	23,691
London, Chatham & Dover	828,027	29,863
Manchester, Sheffield & Lincolnshire	314,831	27,645
Midland	247,008	25,560

The investments in other companies have been subtracted in each case before dividing the capital by the mileage. The London, Chatham & Dover, with 179 miles of road, has a capital amounting to $124,536,370, but only paid $2,648,046 interest on it last year. Nearly $60,000,000 of ordinary stock received no dividend, and on nearly $30,000,000 other stock only 3¼ was paid.

The London city railroads greatly exceed the above figures, but they are not properly compared with ordinary railroads. These city lines had:

	Per mile. Capital.	Gross earn.	Net earn.
North London	$1,598,403	$184,091	$105,509
Metropolitan	2,289,480	124,840	74,572
Metropolitan District	1,872,513	107,037	57,694

The Metropolitan Elevated Railway reports a capital of $1,184,280, and the New York Elevated $1,048,225, and the two together earned $209,848 gross and $98,140 net per mile—the gross earnings being three-fourths more than those of the vastly more costly underground roads in London, and the net a third greater.

THE STARTING POWER OF ENGINES.

It will be remembered that at the close of the report of the tests of the effect of slack made at Burlington, Ia., last month (*Railroad Gazette*, Aug. 13, 1886), we said:

"It is a little difficult to see how an engine of these dimensions (given below) could exert so great a tractive force. Pending inquiries in this respect, there appears no reason to question that the traction indicated by the dynamometer is essentially correct."

The inquiries have since been made, and they do not solve the puzzle, even after making some somewhat doubtful *ex post facto* allowances; but by comparison with some tests yb Mr. C. H. Hudson, referred to more fully in another column under the head of "Further Evidence on the Question of Slack," in which precisely the same fact was observed, and the same difficulty met, we are led to an explanation which brings out a new and interesting fact in respect to the behavior of locomotives, which so far as we know has never been observed, and which is certainly not generally known, as it clearly deserves to be, viz.: that in the act of starting trains, locomotives can and do (when the train is heavy enough) exert a considerably greater tractive force (from 10 to 20 per cent.) than their apparent cylinder tractive power as given by the accepted formula—and within its proper sphere unquestionably correct formula—

$$\frac{\text{Diam. of cylinders}^2 \times \text{stroke}}{\text{diam. of drivers.}} \times \text{average effective pressure.}$$

As to this, the indications of both series of tests are practically identical. There was at Burlington, what Mr. Hudson did not have, a dynamometer car behind the engine, which indicated quite clearly, as nearly as the undulations could be averaged at the time, from 16,500 to 18,000 lbs. traction. In subsequent readings, after the puzzle arose as to where the power came from, this average, it was thought, might be 500 lbs. too high, but the first readings are, on the whole, by much the most likely to be correct. The surprising identity of the difficulty which then appeared in the two tests can best be shown by quoting the substance of Mr. Hudson's words and putting in parallel columns the corresponding figures for the Burlington tests:

	C. H. Hudson,	Burlington.
"Now the power of the engine, estimated by the usual formula, would be as follows, per lb. effective cylinder pressure,	$\frac{17^2 \times 24}{58}$ = 119.59;	$\frac{17\ 1\text{-}32^2 \times 24}{64}$ = 109.1
"The resistance due to gravity would be 19.04 lbs. per ton + 4.40 lbs per ton, as by experiment, for train resistance = 23.44 lbs. per ton, × 735.85 tons of train =	17,616 lbs.	By dynamometer. { 17,000 to 18,000 lbs.
"Then for the necessary average pressure to do the work, we have	17.616 / 119.59	17,500 / 109.1
"Giving as the average cylinder pressure	147.3 lbs.*	160.4 lbs.
* Mr. Hudson erroneously gives this as 144 lbs.		
"But as the steam pressure in the boiler was only	125 lbs.	150 lbs.
"It could not have been in the cylinder	147.3 lbs.	160.4 lbs.
"It might possibly have been	130 lbs.	140 lbs.
"At that figure we would have a theoretical force of	119.59 × 125	109.1 × 140
or	14,949 lbs.	14,728 lbs.
"Which makes the actual resistance as above in excess of the apparent possibility by	17.84 p.c.	11.71 p.c.

The last line of this table would show an almost identical percentage (viz., 17.84 and 18.82) if, as was at first done and as seems more probable, the boiler pressure at Burlington were taken at something over 140 lbs. and the average cylinder pressure at 135 lbs. It is true that the engine was set at 150 lbs. and blowing off a good deal, but a skilled observer stationed on the engine for that purpose read the gauge at 140 lbs. in most of the tests, and an assumption that either the gauge or the observer was wrong seems hardly warranted.

However this may be, the assumed average cylinder pressure is certainly somewhat higher than is possible in such test. We question very seriously if an indicator card can be produced showing an average cylinder pressure within 15 per cent. of the boiler pressure even at the slowest speeds and at what is called (but never is) full stroke, and the average loss is very much greater.

The first conclusion drawn at Burlington from the above contradictory evidence was that there must be some error in the facts. Remeasurement of the engine showed a doubtful $\frac{1}{32}$ in. excess in diameter of the cylinder (which is far more than balanced by the loss of the piston-rod area, not allowed for in the formula), and by this and the other slight and questionable allowances above noted, and by making the entirely inadmissible assumption that the average effective pressure in the cylinder was the same as in the boiler, the observed and computed resistances were brought so near together as 16,000 to 17,500 against 16,365, which

does not even then "force a balance" within over 1,000 lbs.

Mr. Hudson takes a shorter cut to a solution. He rejects the formula, saying:

"Our other results prove that these results (above given) cannot be correct; *we must therefore conclude that the formula for estimating the power is not correct.*"

He then proceeds to make a further corroborative impeachment of the formula by a misinterpretation of some tests of a different nature, which we may have occasion to consider at another time.

But such a slashing impeachment of a formula which is as certainly correct as the multiplication table for giving the average tractive power of an engine during an entire revolution, and hence of any number of revolutions, is of course absurd.

What then is the solution of the problem? It is simply this: Although the formula gives the correct average tractive power during a whole revolution, yet there is a certain position—when one piston is on the dead centre—when both the cylinders together exert less power than the average, and another position, when both crank-pins stand at an angle of 45 degrees with the horizontal, when both together exert more than the average, or 1.4143 times the minimum. This change occurs, as is plain, four times during every revolution, every time either cylinder is on the dead centre giving the minimum, and midway between the maximum. The fluctuations in the comparative traction which the engine thus exerts are as follows, for Mr. Hudson's engine:

	Lbs. traction per lb av. press.	Ratio.
Average, by usual formula, as above: $\frac{17^2 \times 24}{58} =$	119.59	100.
Minimum, one cylinder on dead centre: Area of piston. $\frac{226.98 \times 24}{58} =$	93.92	78.54
Maximum, each engine 45 deg. from dead centre: $\frac{(226.98 \times 24) \times .7071 \times 2}{58} =$	132.83	111.70

In starting a train, the engine, of course, starts the front first, so that in any position of the wheels it makes the first fraction of a turn easily enough. The circumference of the driver being 15.2 ft., after every 3.8 ft. of motion, it is exerting more power than its average, and at the intermediate point less. When it is at the point of maximum pull, it will, of course, pull out the springs and pull itself and the leading cars ahead by a corresponding amount. As the traction falls during the next 1.9 ft. of motion to the minimum, *the stored velocity in the head of the train and in the already extended springs will do the work of pulling the rear cars forward* for the brief instant during which the engine is moving the next 1.9 ft. to its next point of maximum traction. Then it will again extend the springs more and give the forward cars an extra pull forward. The work thus stored will help out the deficient traction at the next low point, and so on indefinitely.

Thus, by a kind of caterpillar-like motion, it is possible, theoretically, for the cylinders of an engine to exert an effective tractive pull for several hundred feet (and for that matter indefinitely) which shall be about one-eighth greater* than its average pressure indicates to be possible. This is, of course, at the expense of velocity, so that no conflict with the fundamental laws of energy and motion is involved, although at first sight it appears as if there must be. The same equalization of the unequal pull by the springs takes place at all times when the engine is in motion, as is evidenced by any dynamometer record, which shows a constant succession of MM-like oscillations. A line averaging these oscillations gives the tractive power in motion, which is likewise what the formula gives, but an equivalent to the *topmost points of them* is, in the way which we have explained, the true measure of the starting power of the cylinders.

So far as we know, as we have stated, this fact has never before been observed or recorded, although "never" is a dangerous word to use. He would be a bold theorist who should venture to predict it in advance, for nothing seems more reasonable than that the average of these quick fluctuations of traction, and not the maximum, would be what would have to be practically relied on. Now that experiment has proved it to be so, however, it is easy to see how it not only can be, but must be, and the fact is well worthy of general note by those having to do with locomotives.

The Philadelphia & Reading statement for the eight months of the company's fiscal year ending July 31 is not by any means a favorable one. It is true that the gross earnings of the railroads show an increase of 6¼ per cent. and the net earnings a gain of 11¼ per cent., but the comparison is with a poor year. The result would be a fair one, however, if it depended on the railroad alone, but for the eight months the Philadelphia & Reading Coal & Iron Company, while its gross earnings were almost exactly the same as in the preceding year, increased its expenses 13 per cent., and shows a deficit on its operations of $1,432,283. There were mined from this company's lands 3,757,000 tons of coal, an increase of nearly 9 per cent. over the previous year, but the increased cost of working has made the greater output a source of loss instead of profit to the company. Taking together the operations of the railroads and of the coal property, the net earnings for the eight months this year have been $6,103,971, or about 7 per cent. less than for the corresponding period of last year. It would seem, indeed, that a company which can earn over $6,000,000 net in two-thirds of a year had some substantial basis to go upon, but if we assume the interest and rental obligations to be still substantially the same as stated in last year's report, we find their total amount for the two companies for the eight months to be $11,416,000, or $5,313,000 more than the net earnings. Thus, in a fairly favorable year the company's property has earned only about 53½ per cent. of its fixed charges, and has consequently increased its floating debt by over $5,000,000. This statement is quite sufficient to emphasize the conclusion, which has been indicated in all the company's recent reports, that there is no prospect for the success of any plan of reorganization which does not involve a very large reduction in the fixed charges.

Very little has been heard lately of the different plans of reorganization proposed. Under the syndicate plan apparently nothing is being done at present, and we do not hear of any extensive deposits of securities. Some six months ago Mr. Gowen promised within 60 days to bring out his plan, which was to obviate all necessity of foreclosure, but he has apparently found the work greater than he expected, for it has not yet been made public. It is very evident indeed that the formation of any such plan is no longer possible, and the time is rapidly approaching when any reorganization at all will be extremely difficult, and the disintegration of the property will be unavoidable.

Further Evidence on the Question of Slack.

It never rains but it pours, and after some question has been investigated with care, and some evidence supposed to be new obtained, it is no uncommon thing to have a lot of hitherto unsuspected and unpublished evidence turn up, bearing on the same question. This proves to be the case in respect to the Burlington tests on the effect of slack, which appeared in our issue of Aug. 13. In the *Journal of the Association of Engineering Societies*, for July, 1886, appears a paper by Mr. C. H. Hudson, read before the Western Society of Engineers, entitled "Tests of the Power of Locomotives," which tests are in good part substantially precise duplicates of those made at Burlington as respects the behavior of the locomotive in starting trains, although not made with any view of testing the effect of slack. The same fact, that with such trains the worst pull on the engine comes after a number of revolutions have been made and the train can be considered to be fairly started so far as the slack can assist in starting it, appears in these tests as at Burlington. The general results of the tests are as follows:

Experiment 7.—Test of starting power of 17×24 engines, weighing 58 tons. Grade 0.91 per cent. (48.05 ft. per mile), and 2 deg. curve.
Average weight of cars, 24.21 tons; 133 lbs. steam; fair track. No sand used in any of the tests.
A. 30 cars. Could not start them.
B. 22 cars. Started a car length and stalled.
C. 22 cars. Started easily.
D. 24 cars. Moved off slowly.
E. 25 cars. Moved off 60 ft. and stalled.

Experiment 23.—Same as above, except that grade averaged 1.13 per cent., 2½ deg. curve. Engine, 60 tons; 130 lbs. steam.
A. 20 cars. Moved off at 2 or 3 miles per hour.
B. 21 cars. Started them all right.
C. 22 cars. Moved them 100 ft. and stalled.
D. 22 cars. Moved them 200 ft. and stalled. *Then took slack*, as they stood, and took them off, but slowly.

This last note shows that slack does come in conveniently, as is beyond question, but it also shows that the need for the assistance of slack does not decrease materially in the first 200 ft., which means that it is in fact less relied on than is sometimes imagined. The succeeding test is of interest as appearing to show (what is contrary to much other evidence) that the hauling power in motion was not greatly more than the starting power, since with a train of only three more cars it was found that the grade and curve combined was too much for the power of the engine, and the grade above about equal to it.

Experiment 25.—Same engine, with a train of 25 cars, was caused to approach the above 2½ deg. curve at 140 revolutions per minute (20 miles per hour). At end of curve, about 1,000 ft., was making 115 (9.67 miles per hour). On succeeding short tangent picked up to 120. Revolutions at beginning and end of a succeeding 3 deg. curve (length not given) 120 (16.5 miles) and 95 (13.5 miles).

The following series of tests, especially the last one, is, perhaps, the most conclusive of any as to the slight assistance which the slack contributes:

Experiment 26.—Same train and cars as above, 0.952 per cent. grade. Steam, 131 to 135 lbs. Light wind in front.
A. 22 cars. Started them easily.
B. 24 cars. " " "
C. 25 cars. " " "
D. 26 cars. Took them off slowly.
E. 27 cars. Moved them slowly 150 ft. and stalled.
F. 28 cars. Took them off slowly.
G. 30 cars. Moved them 30 or 40 ft. and stalled. Second trial, 60 ft. and stalled.
H. 29 cars. Took them 100 ft. and stalled.
I. 28 cars. Took them nearly 500 ft., until engine was 200 ft. upon a 6-deg. curve, and stalled. No sand, wheels did not slip.

After giving the above results Mr. Hudson calls attention to a further result of these tests which is likewise extraordinarily similar to the results at Burlington, viz.: a puzzle as to how the engine could actually exert the tractive power which it apparently did exert. As this question has no direct relation with the preceding, we have discussed elsewhere, under the head of "The Starting Power of Engines," the explanation of the puzzle and the very interesting facts which its solution seems to bring out.

A Permanent Way Exhibition.

The lately organized Belgium Society of Engineers recently held an exhibition in Brussels of objects connected with railroad superstructure, intended especially to illustrate the various substitutes for wood cross-ties, classified as follows: 1, isolated sleepers (like the cast-iron post sleepers of India); 2, cross-ties, divided into four classes, *a*, trough-shaped, *b*, beam-shaped, *c*, composite (of iron and wood), *d*, designs for portable tracks; 3, longitudinal sleepers; 4, rail fastenings; 5. nut locks; 6. other appliances.

There was only one entry under Class 1, known as "Viol's universal rail support;" no pot sleepers were exhibited. Mr. J. W. Post, Engineer of the Dutch State Railroad Company, himself the designer of one of the most promising iron cross-ties, reports to the *Journal* of the German Railroad Union, that the isolated sleeper "is evidently dying out."

His report says that in the second class (cross-ties) were shown all forms, from the historical Vautherin cross-tie down to the improved Gotthard tie with the inclination of 1-20 for the rail, and an extra thickness of the plate at the rail seat rolled in the tie—his own design. Among the trough-shaped ties, samples were sent from four of the Prussian state railroad directories (which work about 2,000 miles each), and from the Baden state railroads; the Hohenegger and Heindl systems from the Austrian and Bavarian roads; samples from two railroads in Holland, one showing a tie which with its screw fastenings had been in service 20 years, while the London & Northwestern showed what Mr. Post called Webb's "Vautherin system with wrought-iron pieces riveted on to receive the wooden or steel key for bull-head rails," the original Vautherin tie; old and new designs by Brunon; while Richie & Garage sent a tie without any bolt-holes, "the fastenings for which, however, require a fearful complexity in the process of rolling;" Cantero turns his trough tie upside down, thus ⌐¬, and adds to its weight by filling it with ballast; Boyenval has a form with double waves, with screw fastenings.

The "beam-forms" are adopted by those who regard the tie as primarily a girder, and the grip on the ballast (friction) as a detail. Their ideal is the ⊤ section. These designs suffer from a superfluity of riveting, screwing, wedging, etc. Paulet rivets cast-iron chairs between angle irons, thus, ⌐⌊; Sévérac rivets on ⊤ and the beams on a foot-plate; Bernard chooses the profile ⌐¬ ⌊⌋, with foot-plates riveted under them and inclined plates on top; Bankart selects an |——| beam and avoids riveting by working off the upper flanges; Monceau rivets cast-iron chairs between a ⌐⌊ ⌐⌊ or ⌐¬ ⌊⌋ profile.

Among composite wood and iron ties was shown a sample of the Cosyn tie which had been in service 20 and 24 years. It has a |——| section on which two oak blocks serve as rail cushions. Helson's tie is similar, with rubber, paper, linoleum, felt, etc., for elasticity, instead of wood; the Monti tie has an |⎽⎽| or | section instead of |——| and the Germain system ⌐ ⌊ irons, with foot-plates below. One fills a trough under the rail foot with wood to hold screw spikes; in the middle of the tie the edges are cut off to reduce the width. Lambert fishes together two old half ties, but requires 68 lbs. of iron to do it.

Portable tracks were not very well represented, the systems of de Ville Chatel, Angelus and Germain being shown.

Very little was shown of longitudinal sleepers, which were condemned at the Brussels Railroad Congress last year.

In rail fastenings two tendencies were shown, one for and the other against screws. In the latter are many kinds, often of doubtful value, of connections by vertical and horizontal wedges, hook-plates, rivets and various other arrangements, including chains and hinges!

Track with iron cross-ties has about one fish-plate bolt nut and 4½ clamp bolt nuts per metre. The latter are even more likely to get loose than the former, and therefore require more watching and tightening than when the nuts are sufficiently protected against getting loose. Belgians were prominent among the exhibitors of nut locks; Linet sent an elastic nut; the Dutch State Railroad uses the elastic ring, and has projections rolled or pressed on the surface with

*Really considerably more than one-eighth, if we were to consider the fluctuations of pressure in the cylinder during its stroke, which is at a maximum at the quarter-points of the stroke (when working full stroke) considerably above the average pressure of the stroke. This refinement, however, it seemed needless to enter into.

which it comes in contact; Nicaise uses a rectangular instead of a triangular section for the screw-thread. Abras puts on two nuts, which run together pyramidally, one over the other. Bernard makes an elastic ring with projections which fit into cavities. An anonymous exhibitor drills the end of the bolt, and after the nut is screwed on expands the bolt slightly with a punch, but not so much but that it is possible to unscrew the nut with the wrench. Mr. Post regrets that the English and Americans, "who have reliable, but unfortunately too costly nut-locks," were not represented at the exhibition. The subject he recommends to the attention of manufacturers.

Among the miscellaneous exhibits, Mr. Post mentions Mr. Sandberg's 100-lb. rail, "for railroads of the first rank, on wooden or iron ties." "Very probably," he says, "experimental sections will be laid with this rail on the Luxemburg and the Brussels & Antwerp lines. The use of heavier materials for superstructure deserves the attention of engineers in consideration of the constantly increasing speed of locomotives and trains."

One of the curiosities of the exhibition was Somzée's "continuous road," a rolled plate about 6½ ft. wide covering the whole length of the road-bed without interruption, bearing two longitudinal plates on which the rails rest. "Certainly original," says Mr. Post. "The 'music of the future' some think. They forgot to say how tamping could be managed with it."

Erie Earnings in July.

The earnings of the Erie continued favorable in July, though the gain over last year in net earnings was not so great as in June, and the net earnings in July were not so much larger than those in June as they were in 1882, 1884 and 1885.

The gross and net earnings and working expenses of the Erie proper in July for nine successive years have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1878	$1,157 691	$830,382	$326,709
1879	1,273,533	957,683	315,850
1880	1,580,975	1,014 658	566,317
1881	1,787,080	1,114,673	672,407
1882	1,850,260	1,122,989	727.271
1883	1,634,687	1,131,165	503,522
1884	1,458,186	1,007,307	450,879
1885	1,368.180	878,779	429,401
1886	1,596,194	1.023,171	573,023

The gross earnings this year have been exceeded only in the three years from 1881 to 1883, and the net earnings only in 1881 and 1882. The increases over last year are:

	Gross earn.	Expenses.	Net earn.
Amount	$288,014	$144,392	$143.622
Per cent	22.0	16.4	33.4

Meanwhile the earnings, expenses and rental of the leased New York, Pennsylvania & Ohio Railroad have been in July since the lease:

	1883.	1884.	1885.	1886.
Gross earn	$612,896	$480.062	$372,854	$572.312
Expenses	363.518	336,029	312,387	355,331
Net earn	$249,378	$144,033	$60,467	$216.981
Rental	196,127	153,620	119,313	183,140
Profit	$53,251			$33.841
Loss		$9,587	$58,846	

As on other railroads in the same territory, but more than on most of them, the gain of this road over last year was especially large in July, being 53 per cent., against 22 on the Erie proper, while its net earnings increased 259 per cent., against 33⅓ on the Erie, and there was a profit on the lease instead of the loss in the two previous years.

Adding the profit to and subtracting the loss by this leased line from the net earnings of the Erie proper, we have to compare with the Erie's net earnings in previous years:

1883.	1884.	1885.	1886.
$616,773	$441,292	$370,555	$606,864

The gain this year over last is $236,309, or 64 per cent.

For the ten months of its fiscal year ending with July, the gross and net earnings and working expenses of the Erie proper (excluding the leased Ohio road) have been:

	Gross earnings.	Expenses.	Net earnings.
1877-78	$12.860,778	$8 902.162	$3,958,618
1878-79	12.999,203	9,385.218	3,613,985
1879-80	15 299.817	9.657,940	5.641,877
1880-81	17,208,511	11,008,190	6.200,321
1881-82	16,252.416	10,924,092	5,328,324
1882-83	16 401,064	11,336,019	5,065.045
1883-84	14.351,811	10.269,772	4,082,039
1884-85	12 547,732	8,865 710	3.682,022
1885-86	14,820,292	9,689,539	5,130,753

The gross earnings were exceeded in each of the four years from 1880 to 1883, but the net earnings only in the first three of these years, being larger than in 1882-83. The increases over last year are:

	Gross earnings.	Expenses.	Net earnings.
Amount	$2,272,560	$823,829	$1,448.731
Per cent	18.2	9 3	39.2

Meanwhile, the result on the leased New York, Pennsylvania & Ohio for the ten months has been:

	1883-84.	1884-85.	1885-86.
Gross earnings	$4 882,404	$4,137.674	$4,982,623
Expenses	3.651,569	2,989,738	3,309,910
Net earnings	$1,230,835	$1,147,936	$1,672.713
Rental	1,562,369	1,323.956	1,594,439
Profit			$78,274
Loss	$331,534	$176,020	

In 1883, this road had been leased only three months at the end of July, and for these three months there had been a *profit* of $155,142 on the lease, and the Erie's income from the two roads for the ten months has been:

1882-83.	1883-84.	1884-85.	1885-86.
$5,220,187	$3,750,505	$3,506.002	$5,209,027

The gain over last year is no less than $1,703,000, or 48½ per cent., and the profit has been very nearly as great as in 1882-83, and was greatly exceeded only in 1881.

While there may be a large increase over last year in August and September, as well as in previous months, it is hardly probable that it will be as great in proportion, for the reason that the earnings recovered somewhat in these months last year, and it is especially improbable that the net earnings will approach those of August and September in 1883, when from the two roads the Erie's income was $1,100,065 and $1,037,413, respectively, or nearly as much as in the best four months previous, 30 per cent. of the total made in the fiscal year, and fully one-third more than has ever been made before or since in those two months. It will not be extravagant, however, to expect a profit of $1,300,000 to $1,500,000 in these two months, and the former would bring the amount for the year up to $6,500,000 against in previous years:

1881-82.	1881-82.	1882-83.	1883-84.	1884-85.
$7,459,375	$6,887,681	$7,357,663	$5,279,358	$4,587,056

Those of the first year mentioned were the largest this company has ever had. It will not be surprising if this year's net earnings come within less than a million dollars of those, and be $2,000,000 or more greater than last year, which is an extraordinary gain to make in such a year.

The meeting of the Brake Committee of the Master Car-Builders' Association, and the representatives of the brake companies concerned in the recent tests in Burlington, will be held at No. 73 Broadway, New York, at 10 a. m., on Sept. 16, instead of Sept. 15, as heretofore announced. The change is made on account of the inability of one of the members of the committee to be present in New York on Sept. 15.

The Northwestern grain receipts were a little less in the third than in the second week of August, there having been a decrease in both wheat and corn, but they were still very large; the Northwestern shipments also fell off a little, but the receipts at Atlantic ports were the largest since the arrival of the first canal fleet. Very little grain except oats is shipped by rail from Northwestern markets, but more goes by rail from Buffalo. Thus out of 3,466,000 bushels of grain other than oats shipped from Northwestern markets in the third week of August, only 441,000 bushels went by rail; while out of 2,100,512 bushels shipped from Buffalo the same week 507,700 bushels went by rail.

Apparently the winter wheat movement to Northwestern markets, which was unexpectedly large in July and since, has begun to fall off. In the third week of August the receipts at Toledo and Detroit were the smallest for five weeks, and at St. Lewis the smallest for seven weeks. At Chicago, also, they were the smallest for five weeks; but it is not possible to tell how much of the Chicago receipts are winter wheat. By the third week of August it may have been getting considerable spring wheat from Iowa and Nebraska. Indeed, there are signs that new wheat has begun to go to Duluth, which usually has got scarcely any until the first week of September, but may now be taking wheat from Nebraska, Iowa and Southern Minnesota and Dakota, and not depending, as it has done chiefly heretofore, on Northwestern Minnesota and North Dakota—the country on the lines of the Northern Pacific and the St. Paul & Manitoba. The Duluth receipts for four weeks had been from 113,000 to 187,000 bushels per week, when they rose suddenly to 194,600 in the second week of August and to 396,000 in the third week.

The spring wheat crop being very light this year, it is quite possible that if the winter wheat receipts continue to fall off the total wheat receipts will be no greater in the fall months than they have been already. What their course has been heretofore is indicated by the following statement of the total wheat receipts at Northwestern markets for six weeks:

Week ending—					
July 17.	July 24.	July 31.	Aug 7.	Aug. 14.	Aug. 21.
2,289,742	3,967,079	4,065,814	3,063,191	3,023,663	2,770,997

Thus the movement culminated in the last week of July, from which it fell off nearly one-third by the third week of August.

Though the demand for lake vessels has been great enough to make freights unusually high for two months past, the quantity of grain shipped by lake has not been so great as in some other years. The largest this year in any one week since the first fleet cleared from Lake Michigan ports was 3,405,981, in the second week of August, while the lake shipments for the six weeks ending Aug. 21 were 17,845,844 bushels. This is nearly the same as in the corresponding six weeks of 1881, when the rail shipments were larger than had ever been known before. In 1883 there were five weeks after harvest when the lake shipments exceeded 4,000,000 bushels, the largest being 4,819,000 bushels, while in the six weeks ending Sept. 29 the lake shipments were 20,482,426 bushels,—an average of 3,413,737 bushels per week, against 2,974,307 this year. Evidently the vessels were fully employed this year, and that they have carried less grain must have been due either to a reduction in their number or to the employment of a larger part of them in the ore trade.

During the eight weeks ending Aug. 21 the exports to Europe of flour and wheat from Atlantic ports were immensely greater this year than last, but there was a decrease in the corn exports. Altogether the exports were:

	1886.	1885.	Inc. or Dec.	P. c.
Flour, bbls	1,129,906	581.315	+ 548,591	94 4
= bushels	5.084,577	2,615.917	+ 2.468.660	94.4
Wheat	13,615,017	5.793,127	+ 7,821,890	13.5
Corn	5,344,849	5,938.928	— 594,079	10 0
Other grain	1,088,123	1,271,447	— 183,324	14.4
Total bu	20,132,566	15,619,419	+ 4,513,147	28.9

Thus the gain in the aggregate exports was very large.

The shipments of freight from New York usually indicate what the "fall trade" will be, as merchants in the interior then begin to lay in their stocks. This year, however, the natural course of shipments was delayed by the expectation of the new reduced rate for cotton piece goods, which form a very large part of the shipments ordinarily. The new rate did not go into effect until Aug. 26, but it was confidently expected all the month, so that naturally the goods were held back until that time as much as possible. Thus the through shipments westward over the trunk lines for the first three weeks of the months, which were 67,194 tons, were certainly much less than the sales of goods would have made them, but for this expectation; yet the shipments in the corresponding three weeks of last year, with all rates at the lowest point, were but 71,342, and in 1884 68,246 tons. This indicates that the demand from the West has been better this year than in either of the two previous, and also larger than in 1883, when the shipments for the whole month were less than in the next two years.

The delayed shipments of cotton piece goods have been going forward in great quantities since the new rate took effect, Aug. 26, but this was too late to make the August shipments what they would naturally have been, and for some time the west-bound movement is likely to be abnormally large on that account, while naturally it would probably be larger than in most previous years; for the indications are that a large fall trade has begun. It will need to be very large indeed, however, to equal last year's, when after two or three years of dullness it suddenly revived and remained extraordinarily large after August until January.

The number of hogs packed for the season since February down to Aug. 11 at the eight leading summer packing points is reported to have been 3,561,746 this year, against 3,199,144 last year, when it was larger than in any other year except 1880. The gain over last year is 11⅛ per cent., which is enough to have considerable effect on railroad traffic. The increase has been chiefly at Kansas City, St. Louis and Indianapolis. At Chicago the increase has been 75,000 (4 per cent.), at Kansas City 108,281 (19 per cent.), at Indianapolis 86,000 (65 per cent.), at St. Louis 86,000 (59 per cent.) Chicago packed 52.6 per cent. of the whole number this year, and Kansas City 19 per cent., while St. Louis, which comes next, packed only 7⅛ per cent. Kansas City packed nearly eight times as many as Cincinnati, and excluding Chicago, more than any three other places.

The number of immigrants arriving in this country last July at the six principal ports was 14 per cent. more than last year, but less than in any other year since 1879. But the increase in July (3,866) was greater than for the entire six months previous (2,744, or 1½ per cent.), indicating that the prospect of good times here seems rather more inviting than it was, to foreigners, who are likely to be very well informed as to the prospects of employment.

A statement of the earnings of the Pittsburgh, Cincinnati & St. Louis Railway has been made for July, showing the great increase of 33 per cent. in gross earnings and the enormous one of 64½ in net. This is the only monthly report of earnings and expenses that we have ever seen from any of the numerous western lines controlled by the Pennsylvania Railroad, and it is very desirable that such reports should be made regularly. The monthly statement of the amount the net earnings have exceeded or fallen short of the liabilities, which is given for the whole Pennsylvania western system, has great value, but not as much as a full statement of earnings and expenses. Such reports are nowhere more needed than in this territory north of the Ohio, where none of the railroads with largest traffic, like the Michigan Central, the Lake Shore, the Fort Wayne and the Pittsburgh, Cincinnati & St. Louis, make any monthly reports.

The Grand Rapids & Indiana also reports for July, contrary to its custom, showing a gain of 15 per cent. in gross and 65 per cent. in net earnings. It was not helped, like the roads further south, by the heavy wheat movement in July, unless that may have stimulated the lumber movement, which is heavy on the Grand Rapids & Indiana.

The Ohio & Mississippi is another trunk-line connection which shows a great improvement, gaining 19 per cent. in gross and 31 per cent. in net earnings in July.

The reorganization of the East Tennessee, Virginia & Georgia Company leaves it with the large total capital in stock and bonds of $77,000,000, or about $70,000 per mile of road. The fixed charges, however, will be comparatively small, for this total includes $57,000,000 in stock of various grades, leaving only $20,000,000, or about $18,182 per mile, upon which interest is obligatory. The interest-bearing debt of the new company includes at the start $7,325,000 old divisional bonds, which were not disturbed by the foreclosure, and $11,140,540 consolidated 5s, while the company retains in its treasury a balance of $1,534,460 to provide for improvements. All its car-trust and other obligations outside of the funded debt have been provided for. The interest charge for the first year will be $994,737, and the yearly charge, when the divisional bonds are retired, as they will be in a few years, and replaced by the consolidated issue, and the bonds reserved for improvements are issued, will be $1,000,000. The net earnings, since the road reached its present mileage, have been (the year ending June 30):

1881-82.	1882-83.	1883-84.	1884-85.	1885-86.
$1,283,460	$1,318,284	$1,699,926	$1,288,343	$1,496,268

In previous years there have been large deductions from these net earnings for car-trust payments, interest on floating debt and similar charges; under the reorganized company, it is expected that the only deduction will be for taxes, which have averaged not far from $150,000 a year. Two years ago the road was in very poor condition physically, but under the receivership a great improvement has been made, and it is reported that not much work will have to be done beyond the ordinary renewals.

The margin left for a dividend on the $57,000,000 of stock will be very small unless the profits increase, but it may be enough to give something to the preferred long before the

other stock can get any, leaving the control of the company in the hands of people who get no direct income from it, which is not a desirable state of things. With the enormous capital in various securities issued by the old company, and holders of each insisting on getting some kind of paper for theirs, and the difficulty of securing any reorganization without an agreement, it may have been impossible to avoid this.

The exports of rails to the United States from Great Britain in July, 6,001 tons, cannot be called large, but with one exception they were the largest since November, 1883. For the seven months ending with July these rail exports to the United States have been:

1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
8,948	140,417	184,648	140,047	37,802	14,836	4,813	19,310

The large purchases reported to have been made for a few American roads have not as yet made much of a total therefore.

The British exports to other countries were unusually large in July, amounting to 66,461 tons, against 50,477 last year and 54,043 in 1884; but for the seven months they remain the smallest since 1881, having been:

1881.	1882.	1883.	1884.	1885.	1886.
230,771	328,663	436,792	344,482	305,111	269 402

In July the exports were increased by unusually large exports to Canada, to which went 30¾ per cent. of the total, against 15 per cent. for the previous six months. India has been the chief buyer of English rails for the seven months, having taken 85,689 tons, against Canada's 55,996, and Australia's 51,162 tons, these three countries having taken two-thirds of the total British exports. India and Canada have taken less than last year. Australia a little more. The Argentine Republic follows at a long interval, with 21,357 tons, and the United States is close behind. The exports do not indicate a large amount of construction anywhere. All these countries import all their rails, and get them almost exclusively from England, and all of them have considerable railroad systems to maintain, which must require a good part of these exports. Probably there is more construction in India than elsewhere.

A device for using sand advantageously on locomotives which has not as yet been tried in this country, so far as we know, and which seems worthy of attention and experiment, is illustrated in a late issue of the *Engineer*, as a feature of a new express passenger locomotive built by the Messrs. Neilson for the Caledonian Railway. A small jet of compressed air is introduced into the centre of the sand pipe by a suitable connection, which has the effect of throwing the sand to precisely the point where it is wanted under the wheel. Consequently, the quantity can be very much diminished for equal effect, and it is said that the quantity of sand required when in constant operation is on'y 1 lb. per mile.

This particular engine has only one pair of driving wheels (7 ft. diameter, 18 × 26. in. cylinders) so that a less quantity of sand might naturally be used, but the gap between 1 lb. per mile and the quantity which would be necessary per mile if used in the ordinary way is great, and indicates a promising field for investigation. *The Engineer* says that "this is perhaps the first time where sand has been used on scientific principles" in England.

How much air is used is not stated, and the details of the device are not shown very accurately in the engraving, but the jet escapes about 6 in. from the orifice of the sand pipe, and several inches back of that again there seems to be a small annular passage for the sand, the space beyond and around the point of the air jet being considerable.

The jet is always in operation when the traction requires it while the engine is running with a train, and it is worked simultanously with and by the same handle as the sand valves.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines is given in the current number of the *Railroad Gazette* as follows:

Atchison, Topeka & Santa Fe.—On the *Great Bend Extension* track has been laid from Great Bend, Kan., west 9 miles.

Central Pacific.—The *Oregon Division* is extended north to Castle Rock, Cal., 12 miles.

Chicago, St. Paul, Minneapolis & Omaha.—Extended into Duluth, Minn., 3 miles.

Pennsylvania.—*The Schuylkill Valley Branch* is extended northwest to Pottsville, Pa., 4 miles.

South Florida.—A branch is completed from Lakeland, Fla., south to Bartow, 13 miles.

South Pacific Coast.—A branch is completed from Oakland, Cal., to Berkeley, 4¾ miles.

Troy & Piqua.—Track laid from Troy, O., north 1½ miles.

Union Pacific.—The *Howard Branch* is extended from Howard, Neb., west by north to Loup City, 20 miles. The *Manhattan & Blue Valley Branch* is completed from Garrison, Kan., north to Randolph, 22 miles. The *Salina, Lincoln & Western Branch* is completed from Salina, Kan., west by north to Lincoln, 34½ miles.

Wilmington & Weldon.—Track on the *Wilson Cut-off* is completed to a point nine miles from Smithfield, N. C., an extension of 6 miles; also extended from Rhodes, N. C., northeast 6 miles.

This is a total of 135¾ miles on 9 lines, making in all 2,963 miles thus far reported for the current year. The new track reported to the corresponding date for 15 years has been:

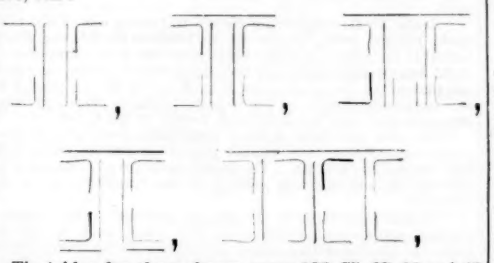
	Miles.		Miles		Miles.
1886	2,963	1881	4 018	1876	1,467
1885	1,564	1880	3,196	1875	702
1884	2,344	1879	1,798	1874	1,006
1883	3.550	1878	1,160	1873	2,284
1882	6,668	1877	1,170	1872	4,498

This statement covers *main track only*, second or other additional tracks and sidings not being counted.

NEW PUBLICATIONS.

Osborn's Tables of Moments of Inertia and Squares of Radii of Gyration. By Frank C. Osborn, C. E. Engineering Era Publishing Co., Cleveland, O.

This little book supplies the same data for built sections as are so familiar to engineers in the books published by various iron manufacturers for rolled shapes. The sections given are five, viz.:



The tables for these shapes cover 126, 75, 27, 28 and 42 combinations respectively, answering all ordinary requirements. Each value is stated to have been calculated and checked independently, so that the tables may be relied on.

Leveling of Vertical Angles and the Method of Measuring Distances by Telescope and Rod, with Table of Heights for all Angles from zero to 22½ degrees. By August Faul, C. E. New York: John Wiley & Sons.

To judge by the number of tables of the above character which have appeared in the last four or five years, this method of surveying and running levels must be coming more and more into use. If not, those who believe in it must believe in it very hard indeed. The present volume is perhaps as useful as any for a certain class of work—in which the vertical angles as a rule are not large—but we judge the method is of real value only in topographical or mapping work, in which a large area is to be covered, but it is never necessary to run far from one's base. For such uses it is unquestionably very useful, but for railroad surveys of any kind we must confess that we are somewhat skeptical as to its practical value. Gen. Herman Haupt, some years ago, made a long survey in Virginia in this way, and liked the result so well that he published a long account of it; but saving money on surveys is not one of the crying needs of railroad companies, new or old, and we suspect that a line of "levels" by this method 100 miles long, made by any ordinary transitman, would check very badly on a bench-mark and cause more trouble in doctoring and checking up the notes, and hunting after errors, than was saved in the field work.

The typographical presentation of the tables is atrociously bad; not worse than in many other American and English publications, but very bad. The Germans have long since brought the art of presenting tables neatly and conveniently to perfection, and little or nothing appears from the German or any other continental press in which these now established printing rules, which cost nothing but a little trouble, are not followed, but the English-speaking mind (if a mind can be said to speak) seems incapable of descending to such a little matter as presenting a table tastefully and conveniently, and accordingly book after book appears on both sides of the water which offends both the eye and the judgment in the form of its tables. Of such offenders this book is one of the worst.

Passing from the form to the substance of the tables, we must confess to some astonishment that it should have been thought necessary to triple the size of the tables in order to say in figures that if a line of sight rises 56.78 ft. in 1,000, it will rise 5.68 ft. in 100, 0.57 ft. in 10, and 0.06 ft. in 1 ft. Any one who cannot move a decimal point readily enough to dispense with this information, it seems to us, is not likely to be able to use the method at all.

The directions and tabular matter for determining horizontal distances seem disproportionately brief, which would make the tables inconvenient for use in a very hilly country. Still, for a certain class of work, even of railroad work, the tables may be convenient.

TRADE CATALOGUES.

Hoisting Engines and Boilers are illustrated in great variety in a large catalogue issued by the Lidgerwood Manufacturing Company, of New York and Brooklyn. This work will be useful to all those interested in hoisting machinery. The Lidgerwood Company has fine works in Brooklyn, well equipped with the best modern machinery, and is in a position to turn out excellent work.

The Art of Making Molds in Sand by Machinery is the title of a well printed and illustrated publication issued by the Peerless Manufacture Company, of Louisville, Ky. The various forms of the Rice sand-molding machine are shown by well-executed engravings, and the principle on which the the molding machine works are clearly explained. One of these machines was exhibited at the recent conventions of the Master Car-Builders and the Master Mechanics.

The Mitis Process of Producing Wrought-Iron and Steel Castings, compiled by Mr. W. F. Durfee, General Manager of the United States Mitis Company, New York, is an interesting account of a novel process of making castings possessing many of the properties of wrought-iron, as they can be welded and forged. The process was invented by the joint efforts of several Swedish engineers, Messrs. T. Nordenfelt, Ostberg, Faustman and Withenstroem.

Wrought iron and steel scrap are melted in crucibles placed in a furnace heated by the combustion of petroleum residuum or naphtha. It is stated that the crucibles last longer than those used for melting steel, though the heat is greater and the charge is melted in less time. The molds are formed with a peculiar sand moistened with molasses, and it is stated that the castings produced have a very smooth and clean surface.

The process presents valuable possibilities and is well described in the pamphlet under notice, particulars of the chemical composition and tensile strength of the castings are also given, accompanied by certificates from eminent English mechanical engineers.

TECHNICAL.

Locomotive Building.

The Tanner & Delaney Engine Co., in Richmond, Va., ships this week a pole-road locomotive and 14 cars to South America, with some other machinery. The locomotive and cars are to be used in hauling mahogany logs, and are built for Mr. George D. Emery, a large shipper of mahogany.

The Brooks Locomotive Works, in Dunkirk, N. Y., have several orders for locomotives on hand to be filled.

The Baldwin Locomotive Works, in Philadelphia, have just completed 2 Mogul passenger engines for the New York, Lake Erie & Western road. These engines have 20 by 24 in. cylinders, 6 drivers and a 2-wheel truck, and are intended to haul the heaviest trains on the road. They are provided with the Wootten fire-box for burning waste anthracite coal, and their use on the Erie is experimental.

Messrs. Spangenberg, Pendleton & Co., of Warren, O., are building an eight-wheel connected locomotive, with flexible wheel base, for the Panther Gap road, in Kentucky. This road has maximum grades of 440 ft. to the mile, and is to be used for logging. It is laid with light iron rail.

The Car Shops.

The Michigan Car Co. in Detroit, Mich., is building a number of Wickes refrigerator cars for the Union Pacific road.

The Washburn Car Wheel Co. in Worcester, Mass., has started up its works with a number of orders on hand.

The Ohio Falls Car Works in Jeffersonville, Ind., have been started up on a contract for 200 freight cars for the Louisville, Evansville & St. Louis road.

The Terre Haute Car Works in Terre Haute, Ind., are building 1,000 freight cars for the Colorado Midland road.

The Gilfillan Car-Seat Co. has been organized in Fort Scott, Kan., for the purpose of manufacturing seats for passenger cars under a patent of Mr. E. N. Gilfillan. The capital stock is $100,000.

Iron and Steel.

The rail mill of the Springfield Iron Co. in Springfield, Ill., which has been idle since January, 1883, will start Sept. 15 to Oct. 1 rolling steel rails from imported blooms. It will have a capacity for about 7,500 tons of rails per month.

The Indianapolis Rolling Mill Co. has finally decided to put up a Siemens-Martin steel plant, and has contracted with Pittsburgh parties to furnish the necessary machinery. The new steel plant will have a capacity of about 80 tons daily and the output will be worked up in the rolling mill.

Irondale Furnace, in Preston County, W. Va., has been repaired and enlarged, and went into blast last week. It is expected to make about 250 tons of iron a week, using coke as fuel.

The Hall Rolling Mill at Hubbard, O., has been sold to parties representing the Mahoning Valley Iron Co., of Youngstown. The mill has been idle for several years.

Aurora Furnace at Wrightsville, Pa., has been sold to H. Schall & Co., of the York Rolling Mills, who will remodel the furnace at once and put it into blast.

Winslow, Allderdice and others, of Akron, Ohio, have formed a company for the manufacture of cold-drawn tubing. The same process which is used now for making cold calendered shafting will be applied to gas and steam pipe, with the result that the outside and inside will be made smooth and bright, as well as true to gauge. The company will have a cash capital of $100,000, and the citizens of Warren, O., have donated $15,000 and 8 acres of ground to induce the owners to locate in that city. Ground was broken this week, and it is expected that the machinery will be in place within 90 days.

Manufacturing and Business.

The Mississippi Glass Co. is furnishing 3,000 deck lights, of very handsome designs, for the J. G. Brill Car Co., Philadelphia; also the same specialties for the Dure Car Manufacturing Co., Wilmington, Del. The 10-pot furnace will be fired up about Sept. 15, when the production, as a whole, will be more than doubled.—*St. Louis Age of Steel.*

The Westinghouse Electric Co. is fitting up a mammoth test room at the Pittsburgh manufactory. A 200 horse-power Westinghouse engine will be used for testing dynamos alone, besides a 75 horse-power in the shops and 75 horse-power operating a 3-mile circuit on their high tension incandescent system.

Westinghouse engines are now running in England, Scotland, France, Holland, Belgium, Germany, Russia, Cuba, Canada, Central America, Mexico, Argentine Republic, Chili, Australia and Japan. They are also in every state and territory in the United States, except Nevada and the Indian Territory.

Messrs. S. R. Bullock & Co., of New York, have closed a contract with the city of Warren, O., for a water-works plant to consist of 12 miles of mains, a stand-pipe 132 ft. high, 100 fire hydrants and necessary pumps, etc., to supply 3,000,000 gallons of water per day. The contract was ratified by a vote of the people—715 for and 15 against it—on Aug. 24 last.

The Wainwright Manufacturing Co., 65 and 67 Oliver street, Boston, Mass., and 93 Liberty street, New York City, has sold exhaust feed-water heaters to the following parties during the month of August: George H. Little, Peabody, Mass.; Melrose Pumping Station, Melrose, Mass.; Rutland Electric Light Co., Rutland, Vt.; Chas. Mullen, Wilmington, Del.; J. N. Bassett, Worcester, Mass.; W. & B. Douglass, Middletown, Conn.; John Post, Jr., & Co., Boston; Mathew Robson, Salem, Mass.; J. A. Wing, Littleton, Mass.; Davidson Steam Pump Co., Brooklyn, and to the Fitchburg Steam Engine Co., Fitchburg, Mass. Sales have also been made of corrugated tube expansion joints to the New York Steam Co., and to H. O. Nelson, Knoxville, Tenn. The company is still selling large numbers of its patent corrugated brass tube radiators. A great increase is noted in the demand for corrugated brass and copper tubes, and the trade in wrought-iron pipe and fittings is reported good.

The Rail Market.

Steel Rails.—Not many orders are reported, although there have been a number of sales of small lots, and prices continue unchanged at $34@$35 per ton at Eastern mills. Some more foreign orders are reported placed for small lots to be delivered at southern and Gulf ports, the prices named being about the same as it would cost to deliver rails from eastern mills at the same points.

Rail Fastenings.—Quotations continue nominally unchanged at 2.40 cents per lb. for spikes in Pittsburgh; 2.75

@3.10 for track-bolts, and 1.65@1.80 for splice-bars. The market is firm and some large orders are reported.

Old Rails.—There is more demand for old iron rails and they are pretty firmly held at $19.50@$20.50 per ton at tidewater. Old steel rails are scarce and are quoted at $22@$23 per ton in Pittsburgh.

A Westinghouse Engine Under Fire.

Penfold, Stead & Co., Jamestown, N. Y., burned a Westinghouse engine in their recent fire in their knitting mill. On examination it was found that although the intense heat had burned off all the external fittings of the engine, melting the brass lubricator, etc., the engine as a machine had suffered no harm, and was repainted and set to work again at an expense of less than $5. The working parts being inclosed and protected by water inside of the crank chamber, escaped without any injury whatever.

A Natural Tunnel.

Mr. Wm. D. Jones, of Philadelphia, who has been the proud owner of probably the only natural tunnel in this country, gave it away the other day to a railroad company. The tunnel is in Scott County, Va., and Mr. Jones gave it away because the railroad company which, known as the South Atlantic & Ohio, proposes to build a track through it and open up to civilization and commerce a rich region lying in Virginia, Kentucky and Tennessee, where Mr. Jones owns over 35,000 acres. President John M. Bailey, of the construction company which is building the road, has been in Philadelphia buying rails and necessary equipments, and soon the tunnel, which by all accounts is one of the natural wonders of the world, will be accessible to sightseers and summer tourists. The tunnel, which has been formed by the action of Stock Creek, the largest fork of the Clinch River, extends in a slight curve 933 ft. through the solid rock of a hill with perpendicular sides, and is 480 ft. high at one entrance and 592 at the other. The springof its spacious arch is from 100 to 110 ft. above the floor, and the width is about 110 ft. Through this broad and roomy passage the waters of Stock Creek flow in a gentle incline, occupying but a portion of the space, and so slight is the grade that the track of the new road can be laid upon the rock floor with but little labor. The rock is of hard limestone, and countless ages must have passed before the waters of the creek burst through the adamantine barrier and cut out a noble arch. The remoteness of the tunnel from civilization is given as the reason why it is so little known. *Harper's Weekly* many years ago published pictures of it, but it has continued in its comparative obscurity up to the present time. The new road, which will make a practical use of the tunnel, will run from Bristol, Tenn., to Big Stone Gap, Va., on the Kentucky state line, a distance of 80 miles. About 40 miles of it have been graded, and it is under contract to be finished in two years Had it been necessary to tunnel through the mountain the company must have spent at least $500,000. The coal found in the country is cannel, bituminous and splint, and will be carried to the seaboard by the Norfolk & Western Railroad for shipment. Mr. Jones if the President of the Stock Creek Coal & Iron Company.—*Philadelphia Evening Record.*

Interlocking and Block System in England.

The Board of Trade returns for 1885 show the following figures, indicating that the interlocking apparatus is very widely used, and the absolute block system is practically universal in England on lines of any considerable traffic.

The number of cases in which the usual requirements of the Inspecting Officers of the Board of Trade have or have not been complied with in the following respects, is given as follows :

	Have.	Have not.
Concentration of signal and point levers.....	31,642	4,993
Interlocking of " " " "	31,865	4,770
Addition of safety points in cases of goods lines and sidings.....	20,675	2,875

	Double.	Single.	Total.
Miles opened for passenger traffic.....	10,279	7,790	18,069
Miles worked on absolute block system...	9,518	4,667	14,185

Thus nearly four-fifths of the railroads open for passenger traffic in the whole kingdom are worked on the absolute block system, and 92½ per cent. of the double-track railroad In Ireland, where traffic is thin, less than a fifth of the mile age is worked on this system; in Scotland, about four-fifths in England, nine-tenths.

The Westinghouse Freight Brake.

The new Colorado Midland road is to have all its freight cars equipped with the Westinghouse air brake, and arrangements have been made to put that brake on 1,000 freight cars which are now under construction for the road. The peculiar nature of this road, and the heavy grades which are necessary on some portions of it, make the use of a continuous brake on its freight trains a necessity.

Iron and Steel Works in the United States.

The American Iron & Steel Association has completed a new directory of the iron and steel works in the United States, showing the extent of those industries now as compared with two years ago. The number of completed rolling mills and steel works described in the directory for 1884 was 434, with 4 building, but in the edition for 1886 only 423 are described, with 13 building. The slightly decreased number of rolling mills and steel works in 1886, notwithstanding the great increase since 1884 in the erection of steel plants, is accounted for partly by the fact that a number of rolling mills which were built to roll iron rails have been wholly abandoned, and partly by the fact that the increasing use of steel rails tends to diminish the demand for the products of iron rolling mills. The annual capacity of the rolling mills in finished iron and steel is virtually the same now as in 1884, being 7,600,000 net tons in 1884 and 7,613,000 tons in 1886.

The Incline to the Ferry at Vicksburg.

The last annual report of the Vicksburg & Meridian Co. gives the following account of the incline built by that company to carry its cars to the ferry-boats on which they are transferred across the Mississippi at Vicksburg :

"For many years freights for Louisiana and Texas points were unloaded from cars at Vicksburg and passed over an incline to a ferry-boat, then taken across the river to Delta, and there raised by an elevator and reloaded into cars at that point.

"This, of course, limited the volume of traffic, was the occasion of considerable delay, and was very expensive.

"To facilitate exchange of traffic between your road and the Vicksburg, Shreveport & Pacific Railroad, it was agreed with that company to adopt a system of inclined planes, with a ferry capable of transferring loaded trains of 12 freight cars, or 6 passenger cars, from one side of river to the other each trip, without change. The extreme rise and fall of the river at Vicksburg is 50 ft., and as it was necessary that the inclines should be built for use at all stages of water, it was decided to make them 1,600 ft. in length on each side of the river, the grade to be 3 5 per 100.

"The most available point, indeed the only point available on the Mississippi side of the river, was at Kleinstown, which is 1½ miles below the river frontage in the city of Vicksburg owned by your company, and used as its only river terminal before the cut-off of 1876, but now only usable when the water is high, and the route selected for the boat passage was from this point crossing the Mississippi River below Vicksburg through the cut-off made in 1876 to Delta, on the Louisiana side.

"Of the 1,600 ft. of incline at Kleinstown, 880 ft. from the top was graded as a road-bed on the river bank, with a foundation consisting of a row of piles under each rail, capped flush with the ground by longitudinal stringers which support the ties or sleepers of the roadway ; and the 720 ft. to foot of the incline is pile trestling.

"The incline has a double track, and is provided with a movable cradle working on wheels resting on the track rails, so as to be easily adjustable to the rise and fall of the river.

"The following is the plan on which the trestles were built :

"Bents 15 ft. apart from centre to centre, are of six piles each, capped with 12 by 14 in. timbers 24 ft. long, drift-bolted to the piles; on these bents rests the deck, composed of eight longitudinal stringers bolted together in pairs, on which are placed the ties or sleepers, 6 by 8 in. by 22 ft., placed 14 in. between centres ; screw-bolts passing through ties, stringers and caps bind the deck firmly to the bents.

"The ties are held against longitudinal creeping by two guard rails of 6 by 8 in. timber placed outside the track rails and bolted to each tie. The guard rails are also intended to prevent the cradle from getting off the trestle in case of derailment.

"To guide the boat to its proper position at the cradle, fenders composed of clusters of five piles, each bound together at the top with a chain, are driven on the shore side of the trestle 40 ft. apart, and 37 ft. from the centre of the trestle.

"When this work was undertaken the water was 50 ft. above low water mark. The grading was commenced in June, and 22,339 cubic yards of earth were taken out and used for raising above high water the side-tracks contiguous to the approach to the incline.

"The continuous high water occasioned considerable delay; but as it was deemed important to complete the work as speedily as possible, in order to secure the fall traffic, the greater portion of the trestle was set in place and fastened by divers in armor, working under water. This, of course, greatly increased the cost and delayed its completion, as it was the middle of August before the river showed 5 ft. above low-water mark, the lowest stage that season."

The work was begun June 6, 1885, and pile-driving on June 18. It was completed Oct. 27, 1885, when the first train crossed, and the incline is now in daily use.

The cost was: For grading, $8,053; foundations for track in cut, $2,737; trestle-work and cradle, $20,241 ; total, $31,031.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows :

Chicago & Eastern Illinois, annual meeting, at the office in Chicago, Oct. 5, at noon.

Housatonic, special meeting, in Bridgeport, Conn., Sept. 15, to vote on the lease of the Danbury & Norwalk road.

Louisville & Nashville, annual meeting, at the office in Louisville, Ky., Oct. 6.

Nashville, Chattanooga & St. Louis, annual meeting, in Nashville, Tenn., Sept. 15. Transfer books closed June 16.

Northern Pacific, annual meeting, at the office in New York, Sept. 16. Transfer books closed Aug. 2.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows :

Atlanta & Charlotte Air Line (leased to Richmond & Danville), 2½ per cent., semi-annual, payable Sept. 6.

Boston & Albany, 2 per cent., quarterly, payable Sept. 30, to stockholders of record on Aug. 31.

Chicago & Northwestern, 1¾ per cent., quarterly, on the preferred stock, payable Sept. 23, to stockholders of record on Sept. 7.

Cincinnati, Indianapolis, St. Louis & Chicago, 1 per cent., quarterly, payable Sept. 15, to stockholders of record on Sept. 3.

West Jersey, 3 per cent., semi-annual, payable Sept. 13, to stockholders of record on Aug. 27.

West Jersey & Atlantic (leased to West Jersey), 2 per cent., semi-annual, payable Sept. 13, to stockholders of record on Aug. 27. This company paid 2 per cent. last September and 3 per cent. in March.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows :

The *Central Traffic Association, Passenger Committee*, will hold its next meeting in Chicago, on Tuesday, Sept. 7.

The *Master Car & Locomotive Painters' Association* will hold its annual convention in Chicago, beginning on Wednesday, Sept. 8.

The *Brake Committee* of the *Master Car-Builders' Association* will hold a meeting at No. 73 Broadway, New York, at 10 a. m., on Wednesday, Sept. 15.

The *Brotherhood of Locomotive Firemen* will hold its annual convention in Minneapolis, Minn., beginning on Wednesday, Sept. 15.

The *National Association of General Passenger & Ticket Agents* will hold its next meeting at the Hotel Brunswick in New York on Tuesday, Sept. 21.

The *General Time Convention* will hold its fall meeting in New York, on Wednesday, Oct. 18.

The *Western Society of Engineers* holds regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m. on the first Tuesday of each month.

Foreclosure Sales.

The *Detroit, Mackinac & Marquette* road will be sold at foreclosure sale in Marquette, Mich., Oct. 20, under a decree granted by the United States Circuit Court. The road extends through the Upper Peninsula of Michigan from Marquette to Point St. Ignace on the Straits of Mackinaw, a distance of 151 miles. The road was built five years ago and has an extensive grant of swamp lands from the state of Michigan. The funded debt consists of $2,280,000 first mortgage 6s, $1,500,000 income 7s and $4,560,000 land grant income 7s. Besides the road the sale will include one-half of the land grants.

The *Michigan & Ohio* road will be sold Nov. 2, under the decree of foreclosure lately granted.

The *Cincinnati & Eastern* road was sold in Cincinnati, Sept. 1, under a decree of foreclosure. The main line, from Cincinnati to Portsmouth, 108 miles, was bought for $900,050 by Albert Netter, of Cincinnati, for account of eastern parties. The New Richmond Branch, 15½ miles in length, was sold separately and bought for $30,000 by Devon & Co., of Cincinnati.

Brake Test Meeting.

The joint meeting of the M. C. B. Brake Committee and the brake companies participating in the recent tests at Burlington, which was to have been held Sept. 15, is postponed until the next day, Monday, Sept. 16, at the same hour (10 a. m.) and the same place, No. 73 Broadway, New York City.

The change of date is made on account of the inability of one of the members of the committee to be present on Sept. 15.

ELECTIONS AND APPOINTMENTS.

Brownwood & Nodaway.—The directors of this new company are: Louis Houck, Thomas F. Wheeler, W. H. Wheeler, Cape Girardeau, Mo.; Daniel S. Brown, Wm. Brown, St. Louis; W. C. Brown, Chicago.

Canadian Pacific.—Mr. G. A. Carleton has been appointed General Agent at Victoria, B. C. Mr. Wm. Van Walters has been appointed General Agent at Seattle, Wash. Ter. Local agents will be appointed at all the Puget Sound ports.

Chicago, Burlington & Northern.—The following circular from General Superintendent W. H. Holcomb is dated La Crosse, Wis., Aug. 20:

"The following appointments are announced for the operation of the line: J. M. Barr, Division Superintendent, in charge of Dubuque Division, with headquarters at Savanna, reporting as to maintenance of track to Division Superintendent at La Crosse ; in regard to all other matters, direct to General Superintendent. The Dubuque Division will include all of the line lying south of the Illinois-Wisconsin state line.

"David Coleman, Division Superintendent, La Crosse, in charge of that portion of the line north of the Illinois-Wisconsin state line and in charge of track on Dubuque Division, reporting to General Superintendent.

"John R. Hastings, Assistant Superintendent, Minneapolis, Minn. (office temporarily at St. Paul), in charge to south end of division yard track at St. Paul, reporting as to maintenance of track to Division Superintendent, La Crosse.

"A. R. Horn, Trainmaster, La Crosse Division, reporting to Division Superintendent, La Crosse. Trains will be dispatched in the names of the division superintendents. All trains will be dispatched from La Crosse as soon as telegraph line is completed."

Chicago & Hyde Park.—The directors of this new company are: Wm. M. Boardman, Charles L. Brooke, Charles Longbridge, Albert J. Norton, Edward R. Sweet, all of Chicago.

Cincinnati, New Orleans & Texas Pacific.—Mr. M. Rohan has been appointed Assistant Roadmaster of the Cincinnati Southern Division. Mr. Rohan has been for some time a track foreman on the road.

Cleveland & Marietta.—The present list of officers of this company is as follows : A. T. Wikoff, President and General Manager; G. H. Candee, Secretary and Treasurer, New York; C. C. Pickering, Auditor and Purchasing Agent; F. G. Jewett, General Freight and Passenger Agent; C. L. Gould, Chief Engineer; Wm. Quinn, Master of Transportation; Alex. Galloway, Master Mechanic; J. I. Kidd, Roadmaster; James C. Taylor, Car Accountant. General offices, Cambridge, Ohio.

Danville & New River.—The officers of this company now are: J. H. Schofield, President; George K. Griggs, Secretary, Treasurer and Superintendent; I. A. Hall, Auditor and Engineer; W. T. Whittaker, Master Mechanic.

Denver & Rio Grande Western.—The following circular from General Manager D. C. Dodge is dated Denver, Col., Aug. 23: "Mr. S. W. Eccles having resigned, Mr. J. H. Bennett is hereby appointed General Freight and Passenger Agent, and will have entire charge of the traffic department. Mr. Theron Geddes is hereby appointed Auditor of this company. In effect Sept. 1, 1886."

East Tennessee, Virginia & Georgia.—Mr. J. W. Dudley has been appointed Train Dispatcher of the Georgia Division in place of Mr. J. E. Smith, who has gone to the Georgia Pacific road. Mr. Dudley was recently on the Baltimore & Ohio.

Joggins.—The officers of this company are: President, Gen. Warner, St. John, N. B.; Secretary-Treasurer, W. C. Milner, Sackville, New Brunswick.

Kansas City, Independence & Park.—The officers of this new company are : President, John W. Byers; Secretary, H. K. Marshall; Treasurer, J. S. Chick. Office in Kansas City, Mo.

Kettle River.—The incorporators are: W. H. Grant, J. P. Knowles, Charles G. Lawrence, J P. Pond, L. F. Shaw. Office in St. Paul, Minnesota.

Louisville & Nashville.—The following from General Manager J. T. Harahan is dated Louisville, Sept 1: "Taking effect this date, Mr. O. M. Dunn is appointed Superintendent of the Memphis Line Division, *vice* Mr. Wm. Colcamp, resigned. Mr. C. Marshall is appointed Superintendent of the New Orleans & Mobile Division, *vice* Mr. O. M. Dunn, transferred."

Mississippi & Tennessee.—A. J. Knapp, whose resignation as General Freight and Passenger Agent of this company was recently announced, was reappointed to that position on Aug. 25, 1886. His office is at Memphis, Tennessee.

New York & New England.—Mr. T. F. Leavitt has been appointed Division Freight Agent, with office at 244 Federal street, Boston, *vice* John A. Ackley, resigned. He will have charge of local freight business on the Eastern, Providence and Woonsocket divisions.

Poughkeepsie Bridge Co.—Mr. W. Van Benthuysen has been chosen President of this company, in place of J. H. Appleton, resigned. The new President represents the Philadelphia syndicate which has lately acquired a controling interest and has undertaken to build the bridge. He was for a number of years in business in New Orleans, but has lately removed to New York.

Richmond & Danville.—The following circular from Traffic Manager Sol. Haas is dated Richmond, Va., Aug. 25: "Mr. E. A. Barber is hereby appointed Assistant General Freight and Passenger Agent of this company, with headquarters at Richmond, Virginia."

Savannah, Dublin & Western.—Mr. Solomon Cohen, of Savannah, Ga., is appointed Receiver of this unfinished road.

St. Johns & Halifax.—The officers of this company are as follows: U. J. White, President and General Manager, Rolleston, Fla.; S. V. White, Vice-President, 7 Wall street, New York; Wm. H. Chandler, Secretary and Treasurer, Rolleston, Fla.; E. S. Spencer, General Freight and Passenger Agent, Rolleston, Florida.

St. John Valley.—The office of this company is at Fredericton, N. B.; the officers are: G. W. Vanwart, President; Wesley Vanwart, Secretary and Solicitor.

Sebasticook & Moosehead Lake.—The officers are : President, Thomas Temple; Secretary, D. E. Thompson; Treasurer, James O. Bradbury; Superintendent, James Mitchell. Office at Hartland, Somerset County, Maine.

Toledo, St. Louis & Kansas City.—Mr. E. J. Madigan has been appointed General Roadmaster, to take effect Sept. 1. Mr. Joseph Hentz succeeds Mr. Madigan as Roadmaster of the St. Louis Division, from Charlestown, Ill., to East St. Louis.

Western, of Florida.—The officers of this company are as follows: Dexter Hunter, President, Jacksonville, Fla.; J. C. Greely, Secretary, Jacksonville, Fla.; W. J. Wilson, Treasurer, Green Cove Springs, Fla.; O. A. Budington, General Superintendent; C. H. Blakeslee, Assistant Superintendent and Master Machinist; John Walsh, Agent and Accountant; C. Tyler, Freight Clerk. General offices, Green Cove Springs, Florida.

PERSONAL.

—Mr. J. H. Appleton, of Springfield, Mass., has resigned his position as President of the Poughkeepsie Bridge Co. It is understood that the recent reorganization of this company has been chiefly due to his efforts.

—Mr. S. W. Eccles has resigned his position as General Freight and Passenger Agent of the Denver & Rio Grande Western road, to take effect Sept. 1. Mr. Eccles resigned partly on account of his own health and partly to attend to some private business plans.

—The report that Mr. Robert Barry had resigned his position with Pullman's Palace Car Co. to accept the position of General Superintendent of the New York Central Sleeping Car Co., which was telegraphed from Chicago last week, is contradicted by authority.

—Mr. Wm. Colecamp resigned his position as Superintendent of the Memphis Division of the Louisville & Nashville road on Sept. 1. He has been on the road over 20 years, beginning as conductor of a construction train. He worked his way up gradually until he was appointed Roadmaster about 1870. After holding that position 10 years he was appointed Superintendent of the Memphis Division in 1880. Mr. Colecamp now retires from business altogether.

—Mr. R. H. Briggs, for three years past Superintendent of Motive Power of the Chesapeake, Ohio & Southwestern road, resigned that position Aug. 31. At the time he took charge of the road the rolling stock was in very poor condition, and chiefly through his exertions it has been placed in excellent order. Mr. Briggs is Second Vice-President of the Master Mechanics' Association, having been elected to that position at the last convention.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1886.	1885.	Inc. or Dec.	P. c
Seven months to July 31:				
Buf., N. Y. & Ph.	$1,446,345	$1,293,759	I. $152,586	11.9
Net earnings...	260,159	276,643	D. 16,484	6.0
Camden & Atl...	312,258	292,276	I. 19,982	6.8
Net earnings....	41,489	42,284	D. 795	1.9
Grand Rap & I..	1,093,200	1,036,810	I. 56,390	5.4
Net earnings...	361,359	264,763	I. 96,596	36.4
Miss. & Tenn....	204,932	258,453	D. 53 521	18.8
N. Y. & New E..	2,137,647	1,809,882	I. 327,765	18.1
Net earnings....	704,008	548 134	I. 155,874	2 .4
Norfolk & West..	1,705,668	1,447,506	I. 258.162	18.0
Net earnings....	659,210	516,263	I. 142,947	28 0
Northern Pacific..	6,088.281	5,606.442	I. 481,839	8.6
Net earnings...	2,704,770	2.470,224	I. 234.546	9.5
Ohio & Miss.....	2,066 150	2,020.214	I. 45,936	2.3
Net earnings...	534.921	469,338	I. 65,583	13.9
Phila. & Reading..	16,183.984	15.352.053	I. 831,931	5.4
Net earnings ..	6.349 851	5,857.224	I. 492.627	8.4
Pitts., C. & St. L.	2,478,349	2,213,550	I. 264,799	11.9
Net earnings...	812,591	809,166	I. 3,425	0 4
St. Jo. & Gd I...	627,657	569,179	I. 58,478	10.3
Net earnings...	271,074	109,839	I. 161.235	146.6
West Jersey.....	725.496	680,299	I. 45,197	6.6
Net earnings....	249,170	236,253	I. 12,917	5.5
Six months to June 30:				
California South..	$305.435	.....	.....	....
Net earnings...	*35.660	.....	.....	....
Mexican National.	731,430	$704.048	I. $27,382	3 9
Net earnings..	156,039	163,491	D. 7,452	4.6
Month of June:				
California South.	$56,430	.....	.....	....
Net earnings...	4,949	.....	.....	....
Month of July:				
Buff, N Y & P..	$245.709	$210,318	I. $35,391	16.8
Net earnings...	64,477	39,756	I. 24,721	61.9
Camden & Atl...	97,732	86.237	I. 11,495	13.4
Net earnings...	45,752	42,195	I. 3.557	8.7
Grand Rap. & I...	202,249	175,449	I. 26,800	15 3
Net earnings...	87.003	52,636	I. 34.367	65.3
Hous. & Tex. C...	191.448	152,554	I. 38,894	25.4
Net earnings...	32,926	*2.847	I. 35,773	...
Miss. & Tenn....	24,541	23,851	I. 690	2.9
N. Y. & New E...	345,493	295.967	I. 49.526	16 7
Net earnings...	120 365	109.744	I. 10,621	9.7
Norfolk & West..	256 280	210,476	I. 45.804	22.0
Net earnings...	93,114	70,570	I. 22,544	32 0
Northern Pacific..	1,100.025	1,000,011	I. 100,014	10.0
Net earnings ...	534,526	549.444	D. 14 918	2.7
Ohio & Miss.....	335,431	281,799	I. 53,632	19.0
Net earnings....	110 963	84.623	I. 26,340	31.0
Phila. & Reading	2,763 266	2,641,851	I. 121,415	4.6
Net earnings. ..	1,250 355	1,138.067	I. 112.288	9 9
Pitts., C. & St. L.	396 522	298,116	I. 98.406	33.0
Net earnings...	143,410	87 021	I. 56,389	64 5
St. Jo. & Gd. I ..	80,672	71,659	I. 9,013	12.5
Net earnings. ..	21,327	9,339	I. 11,988	128.5
Tol., St. L. & K C.	42,043	23,147	I. 18.896	82.1
West Jersey.....	179,857	169,505	I. 10 352	6.1
Net earnings...	72,522	51,372	I. 21,150	41.5
Third week in August:				
Buff, N. Y. & P..	$61,600	$55,100	I. $6,500	11.8
Buff., R. & Pitts.	32,607	24,858	I. 7,749	31.0
Canadian Pacific.	204,000	175.000	I. 29 0 0	16.1
Central Iowa.	29,638	28.460	I. 1,178	4.2
Chic. & Alton....	178,038	176 651	I. 1,387	0.8
Chi. & East. Ill..	44,956	38 094	I. 6,862	18.1
Chi. & N. W.	526,300	446 0 0	I. 80,300	18.0
C., St. P., M. & O.	114.383	114.502	D. 119	0 1
C., I., St. L. & C.	52 811	47,900	I. 4.911	10.2
Cleve., Ak. & Col.	11,703	10 890	I. 813	0 7
Den. & R. G.....	133,181	127.067	I. 6,114	4.8
Det., Lan. & No...	22,926	23,251	D. 325	1 4
Illinois Central...	247,600	210,695	I. 36,905	17.4
Iowa lines.	42,900	31,308	I 11 592	34.1
Ind., Bloom. & W.	69,598	61,740	I. 7,858	12 7
Lake Erie & W....	31,045	26,133	I. 4,912	18.9
Long Island.....	99,125	87.787	I. 11,338	12.9
Louisv. & Nash..	264,200	243,385	I. 20,815	8.5
Mexican Central..	64.285	55,775	I. 8,590	15.3
Mil. & Northern..	12,631	9 973	I. 2,657	2.7
N. Y. City & No.	11,804	10,326	I. 1,568	15.2
N. Y., Ont. & W.	32,867	29,614	I. 3,253	10 9
Norfolk & West..	68,572	54,513	I. 14.059	25.6
Oreg. R. & N. Co.	102 326	86 849	I. 15,477	17.8
Peoria, Dec. & E.	18,983	20,208	D. 1,225	6.1
St. Jo. & Gd. I.	25,000	23 044	I. 1,956	8.5
St. P. & Duluth.	31,970	29,680	I. 2,310	7.7
Wab., St.L & P..	264,969	258,124	I. 6,845	2.6

* Deficit.

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

Coal.

Coal tonnages for the week ending Aug. 21 are reported as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Anthracite	673,394	731,623	D. 58, 229	8 0
Eastern bituminous	246,553	201 963	I. 44,590	22,1
Coke.....	67,439	47,442	I. 19,997	42 4

The anthracite companies on Aug. 31 agreed upon a general advance of 10 cents per ton on the steam sizes and 15 cents on the domestic sizes of coal.

The anthracite coal tonnage of the Belvidere Division, Pennsylvania Railroad, for the eight months to Aug. 28 was:

	1886.	1885.	Inc or Dec.	P. c.
Coal Port for shipment..	44 510	56 472	D. 11,962	21.3
S Amboy "	335,988	366,261	D 30,273	8.3
Local points on N. J. divs	511,235	501 63	I. 9,602	1.9
Co.'s use " "	152,318	143,508	I. 8,810	6.1
Total	1.044,051	1.067.874	D. 23 823	2.2

Of the total this year 873,112 tons were from the Lehigh Region and 170,939 tons from the Wyoming Region.

Actual tonnage passing over the Huntingdon & Broad Top road for the eight months to Aug. 28 was:

	1886.	1885.	Inc. or D-c.	P. c
Broad Top coal.....	245,333	101.7 3	I. 147.6?0	145.2
Cumberland coal.... ..	193.483	302,055	D. 108,572	35.9
Total	442.816	403.758	I. 39,058	9.7

The Broad Top coal is mined on the line; the Cumberland is carried through for the Pennsylvania Railroad.

Cumberland coal shipments for the eight months to Aug. 28 are reported by the Cumberland *Civilian* as follows:

	1886	1885.	Decrease.	P.c.
Balt. & Ohio R. R....	1,100,480	1,288,781	188.301	14.6
Bedford Division, Pa. R. R...	171,625	270 996	99,371	36 8
Ches. & Ohio Canal..... ..	131,787	211.789	80 002	37.8
Total	1.403,892	1.771,566	367,674	20.7

Local deliveries are included in the Baltimore & Ohio tonnage.

The coal tonnage of the Pennsylvania Railroad Division of the Pennsylvania Railroad for the eight months to Aug. 28 was:

	1886.	1885.	Increase.	P.c.
Coal...	7,503,511	7,089.219	414,292	5.8
Coke...	2,204 888	1,676,849	528,039	31.4
Total.....	9.708,399	8,766.068	942,331	10.8

This includes all tonnage passing over the road, whether mined on the line or received from other roads. The details of the tonnage this year were as follows:

	Line of road.	From other lines.	Total.
Anthracite.....	1,149,649	2.069 359	3,219,008
Bituminous	3.4'8,436	846 067	4,284,503
Coke....	2,175,615	29,273	2,204,888
Total	6,763,700	2,944,699	9,708,399

The increase this year has been large in spite of miners' strikes and other drawbacks.

Cotton.

Cotton movement for the week ending Aug. 27 is reported as follows, in bales:

	1886.	1885.	Inc. or Dec.	P c.
Interior markets:				
Receipts.....	14.446	10,624	I. 3.822	36.1
Shipments..... ...	14,392	9.890	I. 4,502	45.5
Stock, Aug. 27....	47,590	20,173	I. 27,423	137.0
Seaports:				
Receipts.	12,153	11,695	I. 458	3.9
Exports	15,687	12,881	I. 2.806	21.6
Stock, Aug. 27.....	178,524	128,523	I. 50,001	39.0

The crop year ended Aug 31, and the figures for the full year will not be made up in less than two or three weeks.

The Railway Car Association.

The following circular from Manager C. W. Cashman is dated Buffalo, N. Y., Aug. 25.

"At the solicitation of several members of the Association, it has been decided to open a branch office at Chicago, upon Sept. 1. Mr. C. W. Barnes, who has been connected with the Association since its organization, is appointed General Western Agent, and will have his office in the Home Insurance Building, 205 La Salle street, where all communications relative to the Chicago office should be addressed.

"The Association will be a member of the Railway Mail Exchange, and letters can be sent by train mail when so desired.

"All business pertaining to the general office, Buffalo, N. Y., will continue as heretofore."

Northwestern Freight Association.

A Chicago dispatch of Aug. 31 says: "There was an all-day session to-day of the General Managers' Committee of the lines in the Northwestern Freight Association, called by Mr. J. F. Tucker, of the St. Paul road, to prepare for the pooling of all business, both freight and passenger. The following lines were represented: St. Paul; Northwestern; Burlington; Rock Island; Chicago, Burlington & Northern; Central Iowa; Illinois Central; Minnesota & Northwestern, and Minneapolis & St. Louis. The whole day was spent in preliminary discussions, excepting that the subject of territorial limits was agreeably disposed of. It was decided that the territory should be practically the same as that of the old Northwestern Traffic Association, including business in both directions between Chicago, Peoria, St. Louis, Burlington, Mississippi River points, St. Paul, Minneapolis, Milwaukee, and Lake Michigan ports in Wisconsin. The subject of including business to Washburn and Lake Superior points was not acted upon. An adjournment was had until to-morrow morning, when the subject of milling in transit, which promises to be so troublesome, will come up, and in case the freight pool can be formed, which will require several days at least, the subject of the passenger pool will be considered."

The St. Paul *Pioneer-Press* says that Mr. J. A. Hanley, Traffic Manager of the Minnesota & Northwestern road, has made a definite statement that his road will not join the Northwestern Freight Association as long as the present system of rates on wheat milled in transit is in force. The company does not intend to cut rates, but is strongly opposed to the present system, and will not join in it.

A New Lake Line.

A Chicago dispatch of Aug. 31 says: "Early this season the Delaware, Lackawanna & Western Co. entered into a contract with Captain Ward, of Detroit, to run a line of steamers in connection with its road, between Buffalo and Duluth. The experiment has proved even more successful than was anticipated, and the business is steadily increasing. This line being fairly established, the Lackawanna managers are now turning their attention to a water connection with Chicago, and it is reported that at least six first-class steamers will be placed on the route as soon as they can complete their arrangements."

Southwestern Passenger Association.

A Chicago dispatch of Aug. 31 says: "The plan for the formation of a gross money pool on the passenger traffic between Chicago, St. Louis and Southwestern Missouri River points was subjected to a further revision by the subcommittee, consisting of Messrs. Cable, Newman and Stone, this morning, and was afterward submitted to the General Committee of the Southwestern Passenger Association for further consideration and approval. The new plan provides for the establishment of a gross money pool on all passenger traffic between Chicago, St. Louis and Southwestern Missouri River points (Kansas City, Leavenworth, Atchison and St. Joseph), the pool to continue in existence for five years. The percentages for the first year are to be determined by taking the average of the business done by the various roads during the years 1883, 1884 and 1885. The following year the percentages are to be revised and the same basis upon which percentages were fixed for the year is again to be used, together with the business of the current year. Thus the business of a year is to be added to the previous basis, and averaged up, in fixing percentages, each year during the life of the agreement.

"All the roads interested except the Wabash favored the plan of the subcommittee. The Wabash was opposed to that part of the contract which provides for the taking of the business done during the years 1883, 1884 and 1885, as a basis for fixing the first year's percentages, claiming that the business of those years did not provide a fair basis, and they wanted not only the business of 1882 included, but also the business for the first half of the present year. This was strenuously opposed by the other roads, the representatives of which claimed that the three years' business proposed by the plan of the subcommittee provided as fair a basis for the fixing of percentages for the various roads as could possibly be devised. Owing to the Wabash opposition to the section providing for the fixing of percentages but slow progress was made, and when the meeting adjourned only two sections of the agreement had been approved."

Buffalo Grain Traffic.

Buffalo grain receipts by lake from the opening to Aug. 31 have been as follows for four years past, flour in barrels and grain in bushels, flour reduced to wheat in the totals:

	1883.	1885.	1884.	1883.
Flour... ..	2,455,685	1,182,458	1,295,800	1,261,291
Grain.....	42,591,457	28,465.880	26,385,543	35,711,848
Total, bu.	54,869,892	34,378 170	32,864.543	41,018,303

The receipts this year have been the largest since 1880. A notable feature this year is the very large increase of flour receipts.

The grain shipments eastward by rail from Buffalo to Aug. 31 were 12,944,589 bushels, against 7,121,342 last year, 5,564,198 in 1884 and 8,131,410 bushels in 1883.

Indianapolis Car Movement.

The number of cars received and forwarded at Indianapolis has been:

	Week ending			
	Aug. 7.	Aug. 14.	Aug. 21.	Aug. 28.
1886—Total.....	20,185	20.031	19,633	20,521
Loaded...		15.635	15 329	16.057
1885—Total.....	.....	19,947	23,353	19,730
Loaded...	.....	.....	.....	14.613

The movement shows a considerable increase over the previous week.

Pacific Coast Passenger Business.

Mr. E. A. Ford, General Passenger Agent of the Pennsylvania Co. and controlled lines, has issued a circular asking other lines concerned to join in a convention at the Palace Hotel, San Francisco, on Tuesday, Oct. 12, at 11 o'clock a. m., "for the purpose of adopting some plan in co-operation with the Pacific coast lines for the prompt and effective eradication of the evils with which our passenger interests in that territory are afflicted."

Central Traffic Association.

The committee appointed to revise existing traffic contracts completed its deliberations in Saratoga, Aug. 26. It was decided to submit to the Association, in addition to the traffic points already perfected, including Chicago, Cincinnati, Indianapolis, Louisville, St. Louis and Peoria, the formation of new traffic points at Milwaukee, Toledo, Detroit, Sandusky, Cleveland, Columbus, Evansville, Michigan City, Grand Rapids, Fort Wayne, Logansport, Lafayette, Terra Haute, Cairo, and at such other adjunct ports as may be necessary to protect the places named, so far as east bound freight is concerned. Another important change which the committee will recommend is the taking cognizance of local as well as east bound freight and west bound through and local traffic. The appointment of a permanent arbitrator by the Association will be specially urged in the committee's report.

Rates to Memphis.

A conference recently held has been unsuccessful in securing any agreement as to rates on grain and provisions to Memphis, where a contest has sprung up between the Kansas City, Fort Scott & Gulf and the lines from Chicago & St. Louis.

OLD AND NEW ROADS.

Atchison, Topeka & Santa Fe.—This company, it is stated, has sold to a syndicate of bankers, represented by Kidder, Peabody & Co., $1,000,000 Gulf, Colorado & Santa Fe first-mortgage bonds, to be delivered in December, and $500,000 second-mortgage bonds, to be delivered in October. This sale completes the authorized issue of second mortgage bonds. The proceeds of the sale are to be used for continuing construction on the extension of the Gulf, Colorado & Santa Fe road.

Work is progressing on a new branch known as the Great Bend Extension. Some 20 miles of the grading are completed, and track has been laid from Great Bend, Kan., westward up to the Walnut River for 9 miles. This is one of the branches built under the Chicago, Kansas & Western organization.

Baltimore & Ohio.—On Aug. 30 this company begun to run a train for express freight and emigrant passengers out of New York by a somewhat circuitous route. This train runs from Jersey City to Wayne Junction over the Bound Brook line; thence over the main line of the Philadelphia & Reading to Pittsboro, and thence over the Wilmington & Northern to Wilmington, Del., where it passes on to the Philadelphia extension of the Baltimore & Ohio. This arrangement, of course, is only temporary, but will probably be continued until the connection between the Baltimore & Ohio and the Reading tracks in Philadelphia is completed. No first-class passengers are carried by this route.

Boston & Lowell.—Boston dispatches state that this company has agreed to lease the Central Massachusetts road, which it has operated for some time under a temporary agreement.

Boston, Revere Beach & Lynn.—The stockholders of this company, at a meeting held in Boston, Aug. 26, voted to authorize the guarantee of an issue of bonds to be made by the Boston, Winthrop & Shore Co., the amount not to exceed $325,000 and the interest not to be over 5 per cent. At the meeting it was stated that the Boston, Winthrop & Shore Co. is now practically controlled by the Boston, Revere Beach & Lynn, and that the proceeds of the new issue of bonds are to be used to put the road in good condition and to make some improvements, in order to make it a profitable

feeder, and also to retire all the old stock and bonds. When this transaction is completed the Boston, Revere Beach & Lynn Co. will be practically the whole owner of the Boston, Winthrop & Shore road, subject only to the lien of the mortgage.

Brownwood & Nodaway.—This company has filed articles of incorporation to build a railroad from Brownwood, Mo., to a point near Bear Creek in Bollinger County, a distance of 16 miles. The road will be a branch of the Cape Girardeau Southwestern, and is intended chiefly for lumbering purposes.

Buffalo, New York & Philadelphia.—The statement for July and the ten months of the fiscal year from Oct. 1 to July 31 is as follows:

	July.		Ten months	
	1886.	1885.	1885-86.	1884-85.
Earnings	$245 709	$210,218	$2,102 555	$1,903,490
Expenses	181.232	170,562	1.664,694	1.451,684
Net earnings	$64,477	$39,756	$437,861	$448.806

For the ten months the gross earnings increased $202,065, or 10.6 per cent., and the expenses $213,010, or 14.7 per cent., the result being a decrease of $10,945, or 2.4 per cent., in net earnings.

Camden & Atlantic.—This company's statement for July and the seven months to July 31 is as follows:

	July.		Seven months.	
	1886.	1885.	1886.	1885.
Earnings	$97,732	$86 237	$312,258	$294,276
Expenses	51,980	44 042	270,769	249,992
Net earnings	$45,752	$42,195	$41,489	$42,284
Interest, rentals, etc			60 114	57,777
Deficit			$18,625	$15,493

For the seven months the gross earnings increased $19,982, or 6.8 per cent., and the expenses $20,777, or 8.3 per cent., leaving a decrease in net earnings of $795, or 1.9 per cent. Charges increased $2,337, or 4.0 per cent., the result being an increase in the deficit of $3,132, or 20.2 per cent.

California Southern.—The statement for the half-year to June 30 is as follows:

	Earnings.	Expenses.	Net earnings.
January	$26,664	$43,172	*$16,508
February	47,055	43.068	3 986
March	56.658	87,423	*30,765
April	60,505	58,485	2.020
May	58,123	57,465	658
June	56.430	51,481	4,949
Total, 6 months	$305,435	$341,095	*$35,660

* Deficit.

For the half-year the gross earnings were $1,454 per mile; the expenses were 111.7 per cent. of gross earnings. The road is controlled by the Atchison, Topeka & Santa Fe.

Canadian Pacific.—This company has made arrangements for a steamship line between Vancouver, B. C., its Pacific terminus, and San Francisco, and will enter into competition for freight between San Francisco and Eastern points.

Central Massachusetts.—A Boston dispatch says that this road is to be leased to the Boston & Lowell Co., an agreement having just been concluded. The rental is to be 30 per cent. of the gross earnings, and it is said that the lease contains some provision for the completion of the road to Northampton.

Central, of New Jersey.—This company's leased Lehigh & Susquehanna line has had its entrance into Scranton, Pa., over the tracks of the Delaware & Hudson road, under a lease made with the Lehigh Coal & Navigation Co. 20 years ago. This lease will expire in November next, and it is understood that it will not be renewed, as the Delaware & Hudson Co. intends to use the road itself and run its own trains into Wilkesbarre. In anticipation of this change it is said that a new line from Scranton to Wilkesbarre has been nearly all obtained and that the road will be built this fall, giving the Lehigh & Susquehanna and the Central their own tracks into Scranton.

Central Pacific.—The Oregon Division is now completed to Castle Rock, Cal., 17 miles beyond the old terminus at Delta and 299 miles from San Francisco. The grading is done to Upper Soda Springs, 3 miles beyond Castle Rock, and is nearly finished to Sisson, 9 miles further.

Chicago & Hyde Park.—This company has filed articles of incorporation to build a railroad from Chicago to a point on the Indiana line near Hammond, with a branch from Hyde Park to the town of Lake View.

Chicago, Milwaukee & St. Paul.—This company offers, in answer to an application from the people of Rochester, Minn., to build a branch from its road to Spring Valley to Rochester, reserving the right to purchase the road at the end of two years' time at an advance of 10 per cent. on the original cost. The estimated cost of the road is $180,000, and a company will be formed for the purpose of building it.

Chicago & Northwestern.—A contract for the branch, or short-cut, from Janesville, Wis., to Evansville, has been let by this company to R. B. Langdon & Co., of St. Paul, who are to begin work at once. This branch will be about 18 miles long and will be used as part of the Madison Division, connecting that line with the Wisconsin Division, and giving the company the choice of two roads between Evansville & Chicago.

This company, according to a Milwaukee dispatch, is negotiating for the purchase of a considerable tract of property on the corner of Milwaukee and Huron streets, in Milwaukee, as a site for its new passenger station in that city. The use of this ground depends to some extent on the granting of the right of way through several of the city streets.

Chicago, St. Paul, Minneapolis & Omaha.—This company his finally completed the extension of its Superior Branch from West Superior, Wis., to Duluth, Minn., and now runs trains into Duluth on its own tracks, and has its own terminal facilities in that city. Heretofore it has used the St. Paul & Duluth tracks and stations, and, under agreement with that company, has not been a competitor for Duluth business.

Chicago, St. Louis & Pittsburgh.—A branch line is now under construction, leaving this road at Lansing, Ill., 27 miles from Chicago, and running northwest to South Chicago, where it connects with the Pittsburgh, Fort Wayne & Chicago road. This line is intended to give this road a short connection with the Fort Wayne road and a direct line to the Union Depot in Chicago. It will also reach some large manufacturing establishments, including the United States Rolling Stock Co.'s shops at Hegewisch. The new branch is built under an organization known as the South Chicago & Southern Co., and the grading is done by Mr. P. F. Glover, of Valparaiso, Ind., as contractor.

Detroit, Bay City & Alpena.—Work is now in progress on the grading of a branch line, leaving this road near Tawas, Mich., and running to Loon Lake, a distance of about 20 miles. This branch will reach a large tract of standing pine and will be used chiefly as a logging road.

Earthquake.—The earthquake which did great damage in Charleston, S. C., and vicinity, on the night of Aug. 28, is reported to have cut off railroad communication with that city, but the damage done to the wires has prevented the sending of full dispatches, and we have no particulars of the damage done to the railroad. There is some mention of landslides on the Northeastern road, and of damage to the bridge over the Ashley River, but nothing definite.

Two bad accidents occurred on the South Carolina road, caused, not by the earthquake directly, but by wash-outs due to the breaking down of dams by the vibrations.

Fairchild & Mississippi River.—A contract for building this road from Fairchild, Wis., to Osseo, 12 miles, has been let to C. Matchetter, of Osseo, who is to begin work at once.

Florida Railway & Navigation Co.—Bids for building the extension of this company's Southern Division, from the Little Withlacoochee to Plant City, Fla., on the South Florida road, have been asked for, and the contracts will probably be awarded early in the present month.

Fort Worth & Denver City.—The Fort Worth (Tex.) *Gazette* says: "For some time past it has been the desire of the Fort Worth & Denver to have its own track into this city, but the New York directors consider the cost too great to build in at this time. It would require about 7 miles of track, built through a rough country and necessitating a bridge over the Trinity River. When the road does build its own track in it will not be from Hodge, but from Kiley, the junction of the Fort Worth & Denver and Santa Fe. Twenty-five miles of the grading on the extension from Harrold is done, and tracklaying will before long be commenced."

Grand Rapids & Indiana.—The statement for July and the seven months to July 31 is as follows:

	July.		Seven months.	
	1886	1885.	1886	1885.
Earnings	$202 249	$175 449	$1,093 200	$1,036,810
Expenses	115,246	122,813	731 841	772,047
Net earnings	$87,003	$52,636	$361,359	$ 264,763

For the seven months the gross earnings increased $56,390, or 5.4 per cent., and the expenses decreased $40,206, or 5.2 per cent., the result being a gain of $96,596, or 36.5 per cent., in net earnings.

Illinois Central.—It is stated that this company has negotiated $5,000,000 Illinois Central 3½ per cent. bonds in England. This £1,000,000 of 3½ per cents. is issued against $5,000,000 Chicago, St. Louis & New Orleans 5s, owned by the company and deposited in trust. There is a saving of 1½ per cent. in interest by the operation.

Joggins.—Surveys have been completed and arrangements made for the construction of this road and a contract has been let to Mr. John C. Brown, of St. John, N. B., who is to have the road completed by January next. The line is to run from the Intercolonial Railway at Maccan, N. B., to the Joggins, a distance of 12 miles. It will reach several coal mines, some of which have now no outlet, while others are dependent on water transportation. The road will also pass through a good farming country. Its construction will not be very costly, the most important works being a bridge 250 ft. long over the Maccan River and one 140 ft. long over the Hebert River. The company receives a subsidy of $3,200 per mile from the Nova Scotia and the Dominion governments, and nearly all the right of way has been given.

Joliet, Aurora & Northern.—At a meeting held in Joliet, Ill., Aug. 24, it was decided that an additional issue of bonds should be made for the purpose of extending this road from its present terminus at Joliet, Ill., eastward to Valparaiso, Ind., also from the northern terminus at Aurora, Ill., to Rockford. Work is to be begun on these extensions as soon as the necessary arrangements can be made.

Kansas City, Independence & Park.—This company has been organized to build a railroad from Kansas City, Mo., eastward to Independence, a distance of 12 miles. The road will connect with the cable railroads in Kansas City, and is intended for local and suburban business entirely. It is proposed to build it with electric motors, if possible. If not, light locomotives will be used.

Kettle River.—This company has been organized in Minnesota to build a railroad from a point on the St. Paul & Duluth in Pine County to Kettle River, a distance of about 25 miles. It will be principally a lumber road.

Lackawanna & Pittsburgh.—A report is telegraphed from Buffalo that this road is to be leased to the Delaware, Lackawanna & Western Co., and that that company will shortly begin to run trains over it. This report is not a very probably one in itself, and needs further confirmation.

Lake Shore & Michigan Southern.—This company gives notice that the Buffalo & State Line 7 per cent. bonds, which matured Sept. 1, will be paid on presentation at the office of the Union Trust Co., in New York. The amount of these bonds outstanding is $300,000, and the funds were provided some time ago by the sale of second mortgage consolidated bonds.

Maine Central.—It is proposed to extend this company's Belfast & Moosehead Lake Branch from its terminus at Burnham, Me., westward through Canaan to Madison Bridge on the Somerset road, a distance of about 25 miles. Another extension is also proposed to run from Burnham, by way of Skowhegan, East Madison, Solon and Indian Pond, to Moosehead Lake, following very nearly the line originally proposed for this road.

Mexican National.—The gross and net earnings for the quarter and the half year ending June 30 were as follows:

	Quarter.		Half year.	
	1886.	1885.	1886.	1885.
Earnings	$387 659	$358,379	$731,430	$704,048
Expenses	299,021	284,649	575,391	540,557
Net earnings	$88,638	$73,690	$156,039	$163,491

For the half year the gross earnings increased $27,382, or 3.9 per cent., and the expenses $34,834, or 6.4 per cent., the result being a decrease of $7,452, or 4.6 per cent., in net earnings.

Mexican Railroad Notes.—The following notes are from the *Mexican Financier* of Aug. 21:

The concession for a railroad from Potrero to Cedral, granted in 1883, has been declared forfeited for nonbuilding of road stipulated.

The improved Pullman car service on the Central Railroad deserves note. The latest cars put on are much more comfortable for long journeys, and the courteous Pullman officials are men well suited to the demands of travel in this country.

The International road is actually under construction, and the rapidity with which work is pushed on to Lerdo will largely depend on the extent of the coal-fields tributary to the road, which are now being explored by competent experts. If coal is found in the quantities expected, there is little doubt that the fuel can be delivered in this city (Mexico) for $10 a ton, or less than half the present price. The Central would gain by having this profitable long haul down from Lerdo, and as we have previously pointed out, the connection of the Central with the International will work good instead of harm to the former. The country is suffering not from too many, but from too few railways. Cheap transportation is what is wanted, and statistics show that the railroads are to-day, in very many instances, carrying the products of the country at ridiculously low rates as compared with old-time freighter's charges. In one case freight is brought to this capital at $1.50 per ton where the old charge for cart freighting was $11, and yet the *hacendados* want lower rates still.

Michigan & Ohio.—The bondholders' committee gives notice that all bondholders desiring to join in the plan of reorganization must deposit their securities with the Central Trust Co. in New York by Oct. 1 next.

Missouri Pacific.—This company proposes to build a branch from Dallas, Tex., south by west through Waxahachie and Milford to Waco, a distance of about 90 miles. The people of Waco have offered to give the right of way for 40 miles, if the company will build the branch.

Montana Central.—Work on the first tunnel out from Helena, Mont., in Prickly Pear Cañon, has been delayed by an accident, but the tunnel will, it is expected, be completed during the present month. The headings in the second tunnel, 400 ft. long, met last week, and the tunnel will probably be complete in another week. The big tunnel on the Missouri will not be completed until spring.

New York Central & Hudson River.—A report has been in circulation in New York this week to the effect that a demand has been made upon the company by its employés for a general increase in wages. The officers of the company deny the report and state that there is no movement of the kind general among the employés, although a demand for an increase has been received from a local assembly of the Knights of Labor, at Amsterdam, N. Y. This does not appear at present to represent any general movement among the employés. The relations between this company and its employés have always been much more pleasant than is the case on many other roads, and it is not thought that there is any probability of a strike or any serious trouble, even should the demand above referred to be generally supported.

New York & New England.—The statement for July and the ten months of the fiscal year from Oct. 1 to July 31 is as follows:

	July.		Ten months.	
	1886.	1885	1885-86.	1884 85.
Earnings	$345,493	$295,967	$3,098.371	$2,610,086
Expenses	225,128	186,223	2.013,045	1,836 918
Net earnings	$120 365	$109,744	$1.085,326	$773,168

For the ten months the gross earnings increased $488,285, or 18 7 per cent., and the expenses $176,127, or 9.6 per cent., the result being a gain of $312,158, or 40.4 per cent., in the net earnings.

New York, Rutland & Montreal.—It is stated that this company, which now owns the old Lebanon Springs road, is making arrangements to build a branch from a point on the road just below Lebanon Springs, N. Y., to a junction with the Housatonic Railroad at State Line, the terminus of the State Line Branch of that road. The distance is about 10 miles, through a somewhat rough and hilly country.

New York, Woodhaven & Rockaway.—President Oakley, of this company, is reported as saying that Austin Corbin has contracted for the purchase of a majority of the first-mortgage bonds, the whole issue being $600,000. When the sale is finally consummated the company will be reorganized and pass into the control of the Corbin syndicate. The road will then be operated as a branch of the Long Island Railroad.

Norfolk & Western.—This company's statement for July and the seven months to July 31, is as follows:

	July.		Seven months.	
	1886.	1885.	1886	1885
Freight	$194.713	$153,006	$1,384.420	$1,124.099
Passenger, etc	61,567	57,470	321,248	323,407
Total	$256,280	$210,476	$1,705,668	$1,447,506
Expenses	163,166	139,906	1,046,458	951,243
Net earnings	$93,114	$70,570	$659,210	$516,263
Per cent. of exps.	64	66	61	64

For the seven months the gross earnings increased $258,162, or 18 per cent., and the expenses $115,215, or 12 per cent., the result being a gain of $142,947, or 28 per cent., in net earnings.

Northern Pacific.—The statement for July, the first month of the fiscal year, is as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Earnings	$1,100,025	$1,000 011	I. $100,014	10.0
Expenses	565,499	450,567	I. 114 932	25.5
Net earnings	$534,526	$540,444	D. $14,918	2.7
Per cent of exps	51.4	45.1	I. 6.3	....

The charges, including taxes, rentals, interest and sinking funds, this year were $509,146, leaving a surplus of $25,380 for the month. No preferred stock was canceled during the month. The total interest bearing debt was $72,877,321 at the close of the month.

Ohio & Mississippi.—This company, having failed to comply with the recommendations of the Illinois Railroad Commissioners to put additional passenger trains on the Springfield Division, the Commissioners have referred the case to the Attorney-General of the state. On Aug. 27 the Attorney-General accordingly began suit against the company to compel a compliance with the orders of the commission.

The statement for July and the seven months to July 31, is as follows:

	July.		Seven months.	
	1886.	1885.	1886.	1885.
Earnings	$335,431	$281,799	$2,036,150	$2,020.214
Expenses	224,468	197,176	1,531,229	1.550,876
Net earnings	$110,963	$84,623	$534.921	$469,338

For the seven months this shows an increase in the gross earnings of $45,936, or 2.3 per cent., and a decrease in the expenses of $19,647, or 1.8 per cent., the result being a gain of $65,583, or 13.9 per cent., in the net earnings.

Pennsylvania.—The first train on the Schuylkill Valley Division reached Pottsville, Pa., on Sept. 1, carrying several officers of the road on a tour of inspection. Regular trains will run to Pottsville in a few days. The new terminus is 94⅕ miles from Philadelphia, and brings the road to a central point in the anthracite region.

Philadelphia & Reading.—The Receivers' statements give the following figures for the earnings of the railroad for

July and the eight months of the fiscal year from Dec. 1 to July 31:

	July.		Eight months.	
	1886.	1885.	1886.	1885.
Earnings	$2,763,266	$2,641,851	$18,776,513	$17,667,616
Expenses	1,512,911	1,503,784	11,240,259	10,889,401
Net earnings	$1,250,355	$1,138,067	$7,536,254	$6,778,215

For the eight months the gross earnings increased $1,108,897, or 6.3 per cent., and the expenses increased $350,858, or 3.2 per cent., leaving an increase of $758,039, or 11.2 per cent., in net earnings.

The traffic of the railroad lines is reported as follows:

	July.		Eight months.	
	1886.	1885.	1886.	1885.
Tons coal	1,081,846	1,153,759	7,944,695	7,351,272
Tons merchandise	906,390	724,602	6,849,916	5,147,783
Passengers	2,492,320	2,294 452	16,161,731	14,877,346
Tons coal on colliers	41.286	44.120	337,678	359,574

Here there was an increase in all traffic except in the coal tonnage for the month, and in the shipments by the company's steam colliers.

The operations of the Philadelphia & Reading Coal & Iron Co. were as follows:

	July.		Eight months.	
	1886	1885.	1886.	1885.
Earnings	$1,295.170	$1,364.030	$9.073,495	$9,074,969
Expenses	1.530 102	1,378,349	10 505,778	9.296,026
Deficit	$234,932	$14,319	$1,432,283	$221,957

For the eight months the gross earnings decreased $1,474, or 0.02 per cent., and the expenses increased $1.208,852, or 13 per cent., the result being an increase of $1,210,326, or 545.2 per cent., in the deficit.

The coal mined from the company's lands was as follows:

	July.		Eight months.	
	1886.	1885	1886.	1885
By company	489,724	490.324	3,373,639	2,973,061
By tenants	42,600	73,428	383,082	479,712
Total	532,124	563.752	3,756,721	3,452,773

The total increase for the eight months was 303,948 tons, or 8.8 per cent.

The joint net earnings of the two companies were:

	July.		Eight months.	
	1886.	1885.	1886.	1885.
Railroad Co., net	$1,250,355	$1,138,067	$7,536,254	$6,778,215
Coal & Iron Co., deficit	234,932	14 319	1.432,283	221,957
Total, net	$1,015,423	$1,123,748	$6,103,971	$6.556,258

The decrease in the net total for July was $108,325 or 9.6 per cent.; for the eight months, $452,287, or 6.9 per cent. As the expenses reported do not include anything for interest or rentals, the net earnings given above are the sums from which all fixed charges are to be provided.

Pittsburgh, Cincinnati & St. Louis.—The statement for July and the seven months to July 31 is as follows:

	July.		Seven months.	
	1886.	1885.	1886.	1885.
Earnings	$396,522	$298,116	$2,478,349	$2,213,550
Expenses	253,112	211,095	1,665,758	1,404,384
Net earnings	$143,410	$87,021	$812,591	$809,166

For the seven months the gross earnings increased $264,799, or 12.0 per cent., and the expenses $261,374, or 18.6 per cent., the result being a gain of $3,425, or 0.4 per cent., in gross earnings.

Pittsburgh, Painesville & Fairport.—This company, successor to the Painesville & Youngstown (narrow gauge), has completed a change of gauge and strengthening of structures, and is now running standard-gauge passenger trains. Large docks have been built at Fairport, the Lake Erie terminus, and a large quantity of iron ore is now ready to go forward as soon as the track can be surfaced and new equipment provided. In connection with the Pittsburgh & Western road (which it joins through its leased Pittsburgh, Cleveland & Toledo line), this will make a new route between Pittsburgh and Lake Erie. It is understood that several of the largest Pennsylvania iron firms in Pittsburgh and vicinity have purchased lake-front property at Fairport and made contracts for receiving their supplies of Lake Superior ore over this line. If so, it will have an assured traffic and prove a valuable feeder to the controlled lines of the Baltimore & Ohio in Eastern Ohio and Western Pennsylvania.

Poughkeepsie Bridge.—The Hartford (Conn.) *Courant* is somewhat incredulous, and says: "The Poughkeepsie Bridge has advanced to the important point of being mortgaged for $5,000,000. If it is necessary to be in debt to be prosperous, this is an auspicious opening. The thing now is to get something to be represented by this modest sum of money. There are various opinions among business men as to the new project. Some intimate that they consider this perhaps a discouragement to the Storm King scheme, but not in itself much of a bridge for other purposes, and that it is being worked to keep the river clear of bridges. Others think that it is a *bona fide* business. All who pass any criticism are agreed that the bridge would pay if built. This is a very interesting feature of the case. Should the bridge be put up, it would be of great value to the Hartford & Connecticut Western road and to Hartford, and even if, as would be likely, a branch were built from Tariffville to Springfield, still that would help the road rather than injure the city. Let the bridge go up. A little less talk about mortgages and the price paid for franchises, and a good deal more rattling of hammers, would have an inspiring effect upon the faith of hoping observers."

Powell's Valley.—This company has been organized in Tennessee to build a railroad from Knoxville to Cumberland Gap, with a branch to the Jellico coal mines. Mr. A. A. Arthur, of Knoxville, Tenn., and associates are the incorporators.

Rome, Watertown & Ogdensburg.—An amended and corrected statement for the nine months of the fiscal year from Oct. 1 to June 30 is as follows:

	1885-86.	1884-85.	Increase.	P.c.
Earnings	$1,562,586	$1,223,755	$338,831	27.7
Expenses	973,303	799,898	173,405	21.7
Net earnings	$589,283	$423,857	$165 426	39.3

The figures include the earnings of the leased Utica & Black River road from April last, the beginning of the lease.

Richmond & Danville.—This company gives notice that holders of debenture bonds can receive at the office of the company in New York $1,180 in new 5 per cent. consolidated bonds, bearing interest from Oct. 1, 1886, and $29.50 in cash for each $1,000 debenture bond with all unpaid coupons attached, in accordance with the proposition which the board recently decided to offer.

It is reported that the East Tennessee, Virginia & Georgia Co. has offered to sell to this company the branch road from Morristown, Tenn., to Unaka, 43 miles. This branch constitutes the connection between the East Tennessee road and the Richmond & Danville Western North Carolina Division, and would be of very little value should the Richmond & Danville build the proposed extension of that division from Hot Springs to Knoxville.

The French Broad line, as the proposed extension is called, will pass through some large tracts of land which are known to contain valuable deposits of iron ore, and the owners of this property have offered to contribute liberally to the construction of the road, which may secure its building.

St. John Valley.—At a meeting of the directors of this company, held in Fredericton, N. B., last week, it was decided to have surveys made of the proposed line from Fredericton to Woodstock, through the valley of the St. John River. A number of the residents along the line have offered to give the right of way for the road.

St. Louis, Arkansas & Texas.—A contract has been let to grade the proposed branch of this road from Mount Pleasant, Tex., to Sulphur Springs. The work is to be completed by Dec. 1 next.

Savannah, Dublin & Western.—A receiver was appointed for this company in Savannah, Ga., on application of Ferguson & Co., who have the contract of grading 70 miles of the line and claim $43,000 for work done. The line was to extend from Savannah, Ga., eastward to Macon, and thence to the Alabama line. It was announced some time ago that all the money to build it had been raised.

The appointment of Mr. Cohen as Receiver is temporary, and argument will be heard Sept. 10 on the question of making the appointment permanent. Officers of the company state that this matter can be easily arranged and that in reality the company does not owe Mr. Ferguson anything, as his work has not been done according to the terms of the contract. Mr. Ferguson is a sub-contractor, and the general contractor, Mr. J. H. Powers, has no complaint.

Sebasticook & Moosehead Lake.—Work has been begun on the grading of this road and a considerable force is already employed. The road extends from Pittsfield, Me., on the Maine Central road, northward to Hartland, a distance of about 13 miles.

Sheffield & Birmingham.—A contract to grade 21 miles of this projected road in Alabama has been let to J. C. Neely & Co., of Parkersburg, W. Va. Another contract for 12 miles has been let to Wilson & Co., of Russellville, Ala. A contract for the wooden bridges and trestles for 26 miles has been let to Russell & Stair, of Birmingham, Ala. Other contracts for grading, it is said, are to be let shortly.

South Florida.—This company has completed and opened for business its Lakeland Branch, extending from Lakeland, Fla., southward to Bartow, a distance of 13 miles.

South Pacific Coast.—This company has this year completed a branch or extension from Oakland, Cal., to Berkeley, 4¾ miles. It has also built a branch from Campbell, Cal., eastward to New Almaden, 9½ miles. On the last-named branch track was laid early in the year.

Tennessee Coal, Iron & Railroad Co.—This company has sold to some New York capitalists a tract of 4,000 acres of land in the Sequatchie Valley in Marion County, Tenn. This tract includes the town of South Pittsburgh. The new owners will, it is said, build two blast furnaces and make other improvements at that point.

The company, it is understood, intends to sell all its real estate and to restrict its operations entirely to the running of its railroad, leaving the mining and manufacturing to be done by other parties.

Texas & Pacific.—The stockholders' committee, of which Mr. Henry Clews is Chairman, have retained counsel and announced their intention of continuing to fight all the plans of reorganization so far proposed, and of continuing their efforts to secure the rights of the stockholders.

Troy & Piqua.—Work is now in progress on this line, some three miles having been graded and the rails laid from Troy, O., north 1½ miles. The road is to run from Troy northward to Piqua, 8 miles, and will be parallel with the Cincinnati, Hamilton & Dayton. An extension from Piqua to a connection with the Chicago & Atlantic is proposed, and also a branch from Piqua to Sidney, 10½ miles.

Union Pacific.—On the Manhattan & Blue Valley Branch of the Kansas Division track is now laid from Garrison, Kan., on the Kansas Central, northward to Randolph, 22 miles.

The Howard Branch of the Republican Valley line has been extended from Howard, Neb., west by north to Loup City, a distance of 20 miles. This branch is now 39 miles long, from St. Paul to Loup City.

Track is reported laid on the Salina, Lincoln & Western Branch from Salina, Kan., 185 miles west of Kansas City, west by north to Lincoln, 34½ miles.

Union Point & White Plains.—A contract for the construction of this road has been let to Twiggs & Buckhalter, of Augusta, Ga., who agree to have the grading completed within two months. The road is to run from Union Point, Ga., on the Georgia Railroad, to White Plains, a distance of 18 miles.

Washington, Ohio & Western.—It is reported that this road has been sold to the Richmond & Danville, but nothing definite has been made public. The road, which was originally known as the Alexandria, Loudoun & Hampshire, afterward as the Washington & Ohio, and lately under the present name, extends from Alexandria, Va., to Mount Hill, 50 miles. An extension to Winchester has been surveyed, but no work done upon it.

West Jersey.—The statement for July and the seven months to July 31 is as follows:

	July.		Seven months.	
	1886	1885.	1886.	1885
Earnings	$179,857	$169,505	$725,496	$680.299
Expenses	107,335	118,133	476,326	444,046
Net earnings	$72,522	$51,372	$249,170	$236,253
Interest, rentals, etc			171,844	160,365
Surplus			$77,326	$75,888

For the seven months the gross earnings increased $45,197, or 6.6 per cent., and the expenses $32,280, or 7.3 per cent., leaving a gain in net earnings of $12,917, or 5.5 per cent. The charges increased $11,479, or 7.2 per cent., the result being a gain of $1,438, or 1.9 per cent., in the surplus.

Wilmington & Weldon.—Work is progressing well on the Wilson Short-cut. The tracklayers working southwest have reached a point 9 miles from Smithfield, N. C., and about 39 miles from the junction with the main line. The party working from Fayetteville has the rails laid for 20 miles. Some grading still remains to be done, but a large force is at work and trains will probably run to Fayetteville by the end of November.

ANNUAL REPORTS

The following is an index to the annual reports of railroad companies which have been reviewed in previous numbers of the current volume of the *Railroad Gazette:*

Toledo, Ann Arbor & North Michigan.

This company on Dec. 31 last owned the Southern Division from Toledo, O., to South Lyon, Mich., 61 miles, and the Northern Division, from Owosso, Mich., to St. Louis, 39 miles. These lines were operated for the year 1885.

A connecting line from Durand to Owosso, 49 miles, was under construction, and 32 miles, from Durand to Hamburg, were completed on Dec. 31 last. The remaining 17 miles are now nearly finished. An extension from St. Louis to Mt. Pleasant, 19 miles, has been finished since the close of the year.

During the year the company acquired possession of the Mt. Pleasant & Alma road, 11 miles, which has been used as part of the extension noted above.

The general account is as follows, condensed:

Capital stock		$2,700,000
Funded debt		2,060,000
Bills and accounts payable		136 874
Car trusts, balance		26,305
J. M. Ashley, President, for rolling stock		180,612
Income account, balance		34,557
Total		$5,138,348
Road and equipment	$5,014,089	
Fuel account	7,257	
Accounts receivable	83,456	
Cash	33,546	
		5,138.348

The funded debt includes $1,260,000 Southern Division 6s and $800,000 Northern Division 6s. Of the last-named bonds $400,000 were not issued until Nov. 1, 1885.

The earnings for the year were as follows:

	Southern Division.	Northern Division.	Total
Freight	$156,351	$18.349	$174,700
Passengers	38,067	17,505	55 572
Other	67.542	3,413	70.955
Total	$261,960	$39,267	$301,227
Expenses	150.192	25,914	176,106
Net earnings	$111,768	$13,353	$125,121
Gross earnings per mile	4.294	1,007	3,012
Net " "	1.832	342	1,761
Per cent. of expenses	57.3	66.0	58 5

During the year the work of relaying the Southern Division with steel rails was continued; this will be completed by the close of 1887.

The result of the year was as follows:

Net earnings, as above		$125,121
Taxes	$4,400	
Interest on bonds	103,600	
		108.000
Surplus for the year		$17,121
Surplus from previous year		17,436
Total surplus Dec. 31, 1885		$34.557

The interest charged was on $1,660,000 bonds for the full year and $400,000 additional for two months.

The freight tonnage was as follows:

	South. Div.		North. Div.		Total.	
	Tons.	P. c.	Tons.	P. c.	Tons.	P. c.
North-bound	293,413	80.4	8.032	42.0	301.445	78 5
South-bound	71,541	19.6	11,076	58.0	82.617	21.5
Total	364,954	100.0	19,108	100 0	384,062	100.0

The tonnage of the Southern Division shows an increase of 43,537 tons, or 13.1 per cent. over 1884. Of the total tonnage last year coal furnished 213,052 tons.

When the work now in hand is completed the company will have a main line from Toledo to Mt. Pleasant, 168 miles, with branches to South Lyon, 10 miles, and to Stone Quay, 2 miles, making a total of 180 miles of road.

The Toledo & Cadillac Co. has been organized to build a railroad from Mt. Pleasant to Cadillac, 63 miles. The Toledo, Saginaw & Muskegon Co. has been organized to

build from Mt. Pleasant to Muskegon. Both these extensions will be valuable for the lumber traffic they will bring to the main line.

Cleveland, Youngstown & Pittsburgh.

This company owns a line from Bergholz, O., to Phalanx, 61 miles. An extension to Steubenville and several branches are projected, but not built. The road is now in the hands of a receiver, whose report to the Ohio Railroad Commissioner is for the year ending June 30 last.

The company has $1,000.000 stock and $1,600,000 first-mortgage 6s, on which no interest has been paid for some time past.

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P.c.
Earnings	556,025	$46,864 I	$9,161	19.5
Expenses	51,374	40,269 I.	11,105	27.5
Net earnings	$4,651	$6 595 D	$1,944	29.5
Gross earn. per mile	918	768 I.	150	19.5
Net " "	70	108 D.	32	29.5
Per cent. of exps	91.7	85.9 I.	5.8	..

Rent of tracks and terminal stations amounted to $3,169, leaving a balance of $1,482 for the year.

The road carried last year 37,466 passengers and 103,421 tons of freight. Coal furnished 90,627 tons of the freight.

West Jersey.

This company owns a line from Camden, N. J., to Cape May and Bridgeton, 101.07 miles. It leases (and practically owns) the Swedesboro road, 10.80; the Woodstown and Swedesboro, 11.24; the Salem road, 17.12; the West Jersey & Atlantic, 41.46, and the Ocean City road, 18.50, making a total of 200.19 miles. There was no change in mileage last year. The report is for the year ending Dec. 31.

The roads worked form a line from Camden to Cape May, with branches to Swedesboro, Salem, Bridgeton, Atlantic City and Ocean City.

The equipment includes 30 locomotives; 91 passenger, 6 parlor and 7 baggage cars; 37 box, 2 stock, 75 gondola, 80 dump and 6 caboose cars; 39 band and 39 push cars.

The general account is as follows, condensed:

Stock		$1,485,650
Funded debt		2,851.000
Certificates of indebtedness		4.400
Accounts and balances		144.700
Profit and loss		170,607
Total		$4,656,357
Road and property	$3,432.345	
Stocks, bonds, etc., leased roads	723.075	
Mortgages, etc., held	61,586	
Sinking fund	243,750	
Materials	33,102	
Accounts receivable	113,410	
Cash	49,089	
		4,656,357

The funded debt includes $2,500 old bonds overdue; $1,000,000 due 1896; $1,000,000 due 1899; $748,500 due 1909 and $100,000 Ocean City Railroad bonds.

The earnings for the year were as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Passengers	$800,185	$825,590	D. $25,405	3.1
Freight	384,328	390,196	D. 5.868	1.5
Mail, etc	101,499	103,862	D. 2,363	2.3
Total	$1,286 012	$1.319,648	D. $33,636	2.5
Expenses	809,395	816,343	D. 6,948	0.8
Net earnings	$476,617	$503,305	D. $26,688	5.3
Gross earn. per mile	6,424	6 945	D. 521	7 5
Net " " "	2,381	2,649	D. 268	10.1
Per cent. of expenses	62 9	61.9	I. 1.0	....

This is one of the few lines in this country where the passenger earnings are much larger than the freight receipts.

The earnings of the several lines and the income account were as follows:

	Earnings.	Expenses.	Net earn.
West Jersey	$977.680	$509.768	$577.912
Swedesboro	55,577	24.950	30,627
Woodstown & Swedesboro.	31,129	20.895	10,234
Salem	26,646	28 585	*1,939
West Jersey & Atlantic	185,059	113.304	71.755
Ocean City	9,921	21,893	*11.972
Total	$1,286,012	$809,395	$476,617
Interest, etc., received			14.008
Total			$490,625
Interest, rentals, etc		$296.262	
Dividends (6 per cent.)		89,113	
			385,375
Balance to profit and loss			$105,250

* Deficit.

The profit balance Jan 1. was $132,082; old accounts, depreciation, etc., amounted to $66,725, leaving $65,357. Adding the surplus above the balance at the close of the year was $170,607.

The traffic for the year was as follows:

	1885.	1884.	Inc. or Dec.	P.c.
Pass. train miles	727,800	690,317 I	31,483	4.5
Freight train miles	221,701	215,089 I.	6,612	3.1
Total loco. miles	965,958	927.593 I.	38,362	4 1
Passengers carried	1,809,586	1,810.109 D.	523	....
Passenger-miles	56,78-,069	56 818,113 D.	35,044	0.1
Tons freight carried	467,442	439.670 I.	27,772	6.3
Ton-miles	15,077,143	14,599,913 I.	477.230	3.3

Switching mileage is not reported separately. The average passenger journey was 31.38 miles; the average freight haul, 32.35 miles. The freight traffic is light and entirely local; the passenger business is largely of pleasure and excursion travel, and is carried at low rates.

The average receipt and cost per passenger-mile and per ton-mile were, in cents:

	—Pass.-miles.—		—Per ton mile.—	
	1885	1884.	1885.	1884.
Receipt	1.41	1.45	2.47	2.58
Cost	1.07	1.03	1.35	1.58
Net	0.34	0.42	1.12	1 00

The usual renewals and improvements were made during the year. Expenses were increased by the damage done by unusually heavy tides and storms early in the year. The second track was extended 7 miles.

The Ocean City Railroad Co. was merged in the West Jersey Co. by consolidation; all of its stock was previously owned by this company. The company now holds 4,468 shares of the West Jersey & Atlantic Co.

The year with this road was unfavorable, the general depression in business limiting pleasure and excursion travel.

Burlington, Cedar Rapids & Northern.

This company owns lines from Burlington, Ia., to Albert Lea, Minn., 253; Linn, Ia., to Postville, 94; Vinton to Holland, 48; Muscatine to Riverside, 31; Iowa City to Montezuma, 73; Holland, Ia. to Watertown, Dak., and Worthington, Minn., 387; Iowa City to Clinton, 81; Junction to Decorah, 23; a total of 990 miles. There was no increase during the year. The report is for the year ending Dec. 31.

Of this mileage 403 miles are owned directly; 587 miles are nominally leased but really owned, the company holding all the stock of the leased lines, and carrying their bonds in its capital account.

The equipment includes 101 locomotives; 32 passenger, 2 chair, 13 combination and 14 baggage, mail and express cars; 3,085 box, 20 refrigerator, 120 stock, 716 flat and coal, and 65 caboose cars; 1 directors' and 1 pay car, 12 service cars, 401 hand and push cars, and 10 snow-plows.

The general account is as follows, condensed:

Capital stock		$5,500,000
Funded debt		14,630 000
Accounts and balances payable		223.9.6
Additions, improvements and equipment		2 656,044
Income account		1,422,836
Total		$24,435,806
Road and equipment	$14,576,462	
Cost of leased lines	8,097,013	
Improvement, equipment, etc	137.775	
Coupon interest	742,275	
Materials and fuel	154,219	
Assets; cash, accounts receivable, etc	728,062	
		24,435,806

The funded debt includes $6,500,000 main line 5s; $150,000 Minneapolis & St. Louis 7s guaranteed; $584,000 Iowa City & Western 7s; $825,000 Cedar Rapids, Iowa Falls & Northwestern 6s, and $1,905,000 new 5s; $4,666,000 consolidated 5s. The interest charge is $754,420 yearly.

The earnings for the year were as follows:

	1885	1-84	Inc. or Dec.	P.c.
Freight	$2,284,542	$2,024,175 I.	$260,367	12 8
Passengers	691.174	666 922 I.	24,252	3.6
Other	117.797	105,363 I.	12,434	11.8
Total	$3,093.513	$2,796 460 I	$297,053	10.6
Expenses	2,189 542	1,917,769 I.	271,773	14.2
Net earnings	$903,971	$878.691 I.	$25,280	2.8
Gross earn. per mile	3,123	3,613 D.	490	15 6
Net " "	913	1,135 D.	222	19.6
Per cent. of exps	70.8	68.5 I.	2.3	...

Expenses include taxes, insurance and track rentals. The average mileage operated last year was 990, against 774 in 1884.

The expenses last year were divided as follows:

	Amount.	P. c.
Passenger transportation	$175,983	5 7
Freight "	383,221	12.4
Maintenance of motive power	658.240	21.3
" cars	149,777	4 8
" way	622,423	20 1
General expenses	98,700	3 2
Taxes and insurance	101,218	3 3
Total	$2,189,542	70 8

Renewals included 2,183 tons steel rails and 187,044 new ties. There were 59.42 miles of track ballasted. Three spans of truss bridge and 3,783 ft. of trestle were rebuilt, and other improvements made.

The result of the year was as follows:

Net earnings, as above	$903,971
Interest on bonds	742 275
Balance, surplus for the year	$161,696
Add other income	83,797
Received from cash assets	265,539
Total	$511.032
Improvements and additions to property	325,838
Balance, Dec. 31, 1885	$185,194

Expenditures for improvements included $41,925 for equipment; $70,794 for construction on main line; $150,343 for construction on leased lines; $37,720 for real estate and general offices, and $25,056 for miscellaneous purposes.

The traffic for the year was as follows:

	1885.	1884.	Inc. or Dec.	P.c.
Pass. train-mile	9e9,651	828,7 5	I. 140.26	17.0
Freight " "	1,857,383	1,617,856	I. 233,527	14.4
Total locomotive miles	3,183.957	2,773,720	I. 410 237	14.8
Pass. carried	627 214	556,029	I. 71,185	12.8
Passenger-miles	28,348,874	26,214.965	I. 2,133,909	8.1
Tons freight carr.	2,348,13.;	1,888.986	I. 459 147	24.3
Ton-miles	219,320,849	198,197,693	I. 21,123,156	10.7
Av. train load:				
Passengers, No	29.2	31.6	D. 2.4	7.5
Freight, tons	118.5	122.5	D. 4.0	3 3

Locomotive service cost 18.01 cents per mile. Locomotives ran 1.13 miles to each revenue train mile. The freight tonnage above includes company freight carried free, which was 495,044 tons carried 25,053,527 miles last year.

The average earnings per ton-mile and per passenger-mile were, in cents:

	—Per pass.-mile.—		—Per ton-mile.—	
	1885.	1884.	1885.	1884.
Receipt	2.438	2.544	1.176	1.118
Cost	2.025	2.063	0.810	0.742
Net	0.413	0.481	0 366	0.376

The rate and cost per ton-mile is for paying freight only. Including company freight also the rate last year was 1.041; cost, 0.717; net, 0.324 cent.

The President's report says: "No extensions have been made to your lines during the year. The earnings, after paying operating expenses and interest on bonds, have been expended in the general improvement of the property and equipment, which is in a first-class condition to do the business offered, and to compete successfully with other lines in the same territory."

East Tennessee, Virginia & Georgia.

In the statement published in this column last week there appeared a table giving the capital account as it would be when the reorganization was completed, which was hastily prepared and contained some mistakes. An amended statement is therefore given, as below:

First-preferred stock	$11,000.000	
Second-preferred stock	18.500,000	
Common stock	27,500.000	
		$57,000,000
Consolidated mortgage 5s	$12,675.000	
Divisional bonds, various issues	7,325,000	
		20,000,000
Total stock and bonds		$77,000,000

The mistake made was in including the $2,000,000 Cincinnati & Georgia bonds, which are taken up in the reorganization, and are represented in the new consols and first-preferred stock.

The new consolidated 5s are disposed of as follows:

Issued under plan of reorganization	$11.140 540
Reserved to provide for divisional bonds	7.325,000
Remaining in treasury of company	1,534,460
Total	$20.000,000

Of the amount remaining in the treasury, $1,500,000 can only be asked for improvements and betterments of the road.

It may be added that in the reorganization provision was made for paying off all the car-trust certificates in cash at par; and all of them have been paid, except, possibly, a few which have not been presented, and for these the money is in the hands of the Reorganization Committee. The new company has, therefore, no car-trust indebtedness whatever.

The net earnings for the year ending June 30 last, as given in the statement, were $1,496,268. From this should be deducted about $150,000 for taxes (all miscellaneous charges being included in expenses), leaving a balance of $1,346,268. The interest charge upon the debt of the reorganized company is $994,737, or $351,531 less than the surplus earnings for last year, thus leaving a very substantial margin over all charges.

When the consolidated bonds are all issued the interest charge will be $1,000,000 yearly, and this amount the road should be able to meet, leaving a considerable surplus for the preferred stocks.

Vicksburg & Meridian.

This company owns a line from Meridian, Miss., to Vicksburg, 139.88 miles, with an extension to the Mississippi River in Vicksburg, 3.45 miles; a total of 143.33 miles, with 15.71 miles of sidings.

Since Oct. 26, 1885, the road has been in possession of a receiver, pending a reorganization of the company. The report submitted, however, covers the full fiscal year ending March 31 last.

The equipment includes 14 locomotives; 10 passenger, 1 sleeping and 4 baggage and mail cars; 39 box, 2 stock, 63 flat, 26 coal and 7 caboose cars; 14 service cars, 1 pile-driver and 1 steam shovel. There are also on the road 200 leased box cars.

The general account, condensed, is as follows:

Common stock		$3.962.100
Preferred stock		1,940.613
Funded debt		4,020 000
Current and floating liabilities		531 058
Total		$10,453,771
Cost of road and equipment	$10,181.064	
Betterments account	100 640	
Miss Valley Bank	15,539	
Revenue account	74,330	
Cash and current assets	82.198	
		10,453,771

The funded debt includes $1,000,000 first-mortgage 6s; $1,100,000 second-mortgage bonds and $1,920,000 third-mortgage income bonds.

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P.c.
Freight	$307.699	$296.973	I. $10 636	3 6
Passengers	164,818	169 162	D. 4 344	2.6
Mail and express	20.557	18,3.3	I. 2,184	12.1
Miscellaneous	10.320	11,095	D. 774	7.0
Total	$503 304	$495.603	I. $7,701	1 6
Expenses	426.498	443,940	D. 17.442	3.9
Net earnings	$76,806	$51 663	I. $25,143	48.7
Gross earn. per mile	3 595	3,540	I. 55	1 6
Net " " "	549	369	I. 180	46.7
Per cent. of exps	84.7	89 6	D. 4.9	...

The company has a land grant which amounted to 198,028 acres; from this 62,938 acres have been sold, leaving 135,090 acres on hand. The total amount of sales to March 31 last was $106,527. Sales for last year were 1,688 acres for $2,582, and the expenses of the Land Department were $4,417.

In addition to this grant there are 15,251 acres of outlying lands, on which there is a special lien in favor of $127,000 bonds exchanged for old Southern Railroad bonds.

The income account for the year was as follows:

Net earnings, as above		$ 76,806
Taxes	$ 16,742	
Interest on bonds	114 083	
" floating debt	15,894	
Land expenses	4 417	
		151,136
Deficit for the year		$74,330

Expenditures on capital account were $100,640, the chief items being $44,790 for the incline and transfer at Vicksburg, connecting the road with the ferry over the Mississippi, and $18,111 for change of gauge from 5 ft. to 4 ft. 9 in. The change of gauge was made Oct. 22, 1885.

The traffic for the year was as follows:

	1885-86.	1884-85.	Inc. or Dec.	P.c.
Passenger train-miles.	127.876	131.710	D. 3,834	2 9
Freight train-miles	183,364	160.038	I. 23,326	14 6
Total locomotive miles.	450,642	424,218	I. 26,424	6.2
Passengers carried	109,403	110,233	D. 830	0.7
Passenger-miles	5,164 688	4.491.206	I. 673,482	15.0
Tons freight carried	130.787	122,746	I. 8,041	6.5
Ton-miles	12,367,722	10,509,650	I. 1,858,072	17.7
Av. train load:				
Passengers, No	40 4	34.1	I. 6.3	18.4
Freight, tons	67.4	65.7	I. 1.7	2.6
Average rate:				
Per passenger-mile	3.19 cts.	3.77 cts.	D. 0 58 ct.	17 9
" " net.	0.59 "	0.42 "	I. 0.17 "	40 5
Per ton-mile	2 43 "	2.78 "	D. 0.35 "	12.5
" " net.	0.07 "	*0.01 "	I. 0.08 "	....

* Deficit.

The total freight car mileage last year was 2,172,716, of which 68.7 per cent. was of loaded cars. Locomotives ran 1.45 miles to each revenue train-mile. Locomotive service cost 18.27 cents per mile run.

A plan for the adjustment of the company's affairs is proposed in the report as follows: "The books of the company show the capitalized cost of your 143 miles of railway with appurtenances, including equipment, to have been $10,371,573, an average cost of $72,528 per mile of road. This cost is represented by $5,902,713 of common and preferred stock, an average of $41,278 per mile; by $2,100,000 of cumulative interest-bearing bonds, an average of $14,685 per mile; by $1,920,000 of third-mortgage income bonds, an average of $13,427 per mile, and an additional $3,139 per mile of other indebtedness.

"With a road so heavily capitalized and bonded in proportion to its earning capacity, and with so large a floating indebtedness, there seems to be no way to avoid ultimate foreclosure, unless it be by a reorganizaton, or the carrying into practical effect the plan for an issue of debenture bonds proposed by the committee of share and bond-holders appointed at the last annual meeting of stockholders.

"The plan proposed by that committee was for the company to issue $600,000 of 6 per cent., semi-annual, 20-year debenture bonds, interest upon which, with a proper provision for a sinking fund, to be a lien upon the revenue of the company after providing for current interest on the first and second mortgage bonds. Such debenture bonds to be used in taking up coupons past due and maturing of the first-mortgage bonds, and coupons past due and maturing of the second-mortgage bonds, and for liquidating the floating indebtedness of the company.

"If this plan can be carried out, your board is of the opinion that the payment of interest on the first-mortgage bonds can be resumed April 1, 1887, and on the second mortgage bonds Nov. 1, 1888.

"If holders of first and second mortgage bonds will consent to fund their coupons as proposed by the committee, there is little doubt but that the plan can be carried into practical effect.

"This matter is therefore submitted to the shareholders for such action as they shall determine to be for their interest."